



1. MBBS, FCPS  
Senior Registrar  
Department of Paediatric  
Indus Medical College and Hospital,  
Tando Muhammad Khan,  
Hyderabad.
2. MBBS, FCPS  
Senior Registrar  
Department of Paediatric  
Avicenna Medical College and  
Hospital, Lahore.
3. MBBS, FCPS  
Senior Registrar  
Department of Paediatric  
Avicenna Medical College and  
Hospital, Lahore.
4. MD, PGR, FCPS  
Post Graduate Resident  
Department of Medicine  
Fatima Memorial Hospital, Lahore.
5. MBBS, FCPS  
Senior Registrar  
Department of Paediatric  
University of Lahore.
6. MBBS, FCPS  
Senior Registrar  
Department of Paediatric  
Avicenna Medical College and  
Hospital, Lahore.

**Correspondence Address:**

Dr. Faraz Ahmed  
Indus Medical College and Hospital,  
Tando Muhammad Khan, Hyderabad.  
faraz\_ahmed55@hotmail.com

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## FREQUENCY OF MATERNAL RISK FACTORS IN DIAGNOSED CASES OF EARLY NEONATAL SEPSIS.

Faraz Ahmed<sup>1</sup>, Mohsin Ali<sup>2</sup>, Hussan Ali Sarwar<sup>3</sup>, Miqdad Haider<sup>4</sup>, Muhammad Bilal Safdar<sup>5</sup>, Shehla Usman<sup>6</sup>

**ABSTRACT...** One of the major and important but preventable causes of neonatal morbidity and mortality is Neonatal sepsis. **Objectives:** To determine the frequency of maternal risk factors in diagnosed cases of early neonatal sepsis. **Study Design:** Descriptive cross sectional study. **Setting:** Nursery, Department of Children Hospital and the institute of child health, Lahore. **Period:** 15-01-2016 to 15-07-2016. **Material and Methods:** After approval from hospital ethical committee, according to inclusion and exclusion criteria, 250 patients were enrolled in the study from nursery department of children hospital, Lahore. Maternal risk factors i.e. PROM, meconium stained liquor and preterm delivery were recorded along with the demographic information of each case. **Results:** In our study, out of 250 cases, cases between 1-2 days were 64.8% (n=162) while cases between 3 days of life were 35.2% (n=88), mean+sd was resulted as 2.17+0.69 days. Frequency of maternal risk factors in diagnosed cases of early neonatal sepsis was turned out as 64.8% (n=162) PROM, 29.6% (n=74) meconium stained liquor and preterm delivery was resulted in 21.2% (n=53). **Conclusion:** The leading maternal risk factor is PROM followed by meconium stained liquor and preterm delivery in diagnosed cases of early neonatal sepsis.

**Key words:** Early Neonatal Sepsis, Maternal Risk Factors, Meconium Stained Liquor, PROM, Preterm Delivery.

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### INTRODUCTION

Global neonatal mortality rate is 23/1,000 live births. Approximately four million neonates die annually, according to the World Health Organization, out of which one million die due to neonatal infections.<sup>1</sup>

Developing countries has almost three times more incidence of neonatal sepsis than developed countries where incidence is 10/1000 live births. Sepsis occurring in the first week of life is called as early onset sepsis (EOS) and one occurring in the rest three weeks of life is late onset sepsis (LOS).<sup>2</sup>

Early onset neonatal infections (EONI) are mainly caused by microorganisms that transferred from the mother to the child during pregnancy or birth like group B Streptococcus (GBS) and E. coli.<sup>1,2</sup> The percentage of pregnant women who have

GBS colonies in the vagina or the rectum is about 10-30% and even those who are GBS-negative during the examination initially, may have GBS-positive result during childbirth. Therefore, the percentage of neonates with GBS-induced EONI who born to GBS-negative mothers is 60%.<sup>3</sup>

Early onset neonatal sepsis (EONS) has high mortality but no specific clinical sign and confirmation of diagnosis takes a lot of time. Therefore, consideration of the risk factors is essential for a best diagnostic approach.<sup>4</sup>

One of the important risk factors for EONS and preterm births is prolonged rupture of membrane (PROM) which is defined as rupture of membrane lasting more than 18 hours before labor. Its percentage is approximately 8%-10% of all pregnancies.<sup>5</sup>

Sudhir et al<sup>6</sup> resulted PROM in 71.4%, meconium liquor in 35.7% and preterm delivery in 24% of the cases as maternal risk factors while Agarwal et al<sup>7</sup> resulted these findings in 35%, 20% and 50% of the cases for PROM, meconium liquor and preterm delivery respectively. Thus, significant different frequencies of maternal risk factors were shown in these two studies and we do not have local study or local data (as per best of our knowledge) to address this issue.

The rationale of the study is to find out the frequencies of maternal risk factors in early neonatal onset of sepsis in our population as above mentioned studies have significantly different results and we have deficiency of local study on these risk factors. Thus we may be able to apply the results of our study on local population and make some strategy and guidelines which will be beneficial for the patients, pediatricians and gynecologists to control the morbidity and mortality by these maternal risk factors.

### OBJECTIVE

To determine the frequency of maternal risk factors in diagnosed cases of early neonatal sepsis.

### MATERIAL AND METHODS

A Cross sectional study conducted in Nursery Department of Pediatric Medicine, The Children's Hospital & the Institute of Child Health, Lahore over 6 months from 15-01-2016 to 15-07-2016. Sample size of 250 cases was calculated with 80% power of test, 5% level of significance and taking expected 20% of meconium stained liquor in cases with neonatal sepsis. Non-Probability, consecutive sampling was utilized as sampling technique. Age between 1-3 days, both genders and all diagnosed cases of neonatal sepsis (as per operational definition) presenting within 24 hours of symptom were categorized as Inclusion criteria. All cases refused to participate in the

study were excluded. After approval from hospital ethical committee, according to inclusion and exclusion criteria, 250 patients were registered in the study from nursery department of Children Hospital, Lahore.

All basic demographic information of each case (name, age, address and contact) was also noted. Maternal risk factors i.e. PROM, meconium stained liquor and preterm delivery was recorded (as per operational definition). All this information was registered by the researchers themselves through pre-designed Performa.

SPSS version 20 was used to analyze the collected data statistically. Quantitative variables like maternal and gestational age was presented in form of mean  $\pm$  S.D. Qualitative variables like gender, and maternal risk factors i.e. PROM, meconium stained liquor and preterm delivery were recorded as frequency and percentage. The data was stratified for maternal and gestational age and gender of the patients to control the effect modifiers. For stratification data, Chi square test was used and p value  $<0.05$  was considered as significant.

### RESULTS

64.8% (n=162) of the total population is between 1-2 days while 35.2% (n=88) were between 3 days of life, mean  $\pm$ sd was  $2.17 \pm 0.69$  days. 48% (n=120) were male and 52% (n=130) were females. (Table-I) Among maternal risk factors in diagnosed cases of early neonatal sepsis, PROM was found in 64.8% (n=162), 29.6% (n=74) had meconium stained liquor and preterm delivery was found in 21.2% (n=53). The data was stratified for maternal and gestational age and gender of the patients to control the effect modifiers. Chi square test was used for stratification data and p-value  $<0.05$  was considered as significant. (Table-II)

	Age (in Days)		Gender	
	1-2	3	Male	Female
No. of Patients	162 (64.8%)	88 (35.2%)	120 (48%)	130 (52%)
Total	250		250	

Table-I. Age and gender distribution (n=250)

Maternal Risk Factors	Age (Days) P-Value 0.61		Gender P-Value 0.43		Maternal Age (Years)		Gestational Age (Weeks)	
	1-2	3	Male	Female	20-30	31-35	≤37	>37
PROM	110	52	78	84	131	31	123	39
Meconium stained liquor	54	20	29	45	57	17	61	13
Preterm delivery	39	14	24	29	29	24	53	0

**Table-II. Stratification for maternal risk factors in diagnosed cases of early neonatal sepsis with regards to age, gender, maternal age and gestational age (n=250)**

## DISCUSSION

In this study, we have tried to ascertain the risk factors for a fatal entity i.e. neonatal sepsis. We compared results with previous studies where Sudhir et al<sup>6</sup> revealed PROM in 71.4%, meconium liquor in 35.7% and preterm delivery in 24% of the cases, these findings match the findings of our study while there are other studies which have different results like that of Agarwal et al.<sup>7</sup> There is findings showed 35%, 20% and 50% of the cases for PROM, meconium liquor and preterm delivery respectively. A study by Kurien Anil Kuruvilla et al<sup>8</sup> showed strong association of early onset sepsis with meconium stained liquor and multiple vaginal examinations. Premature rupture of membrane (PROM), meconium stained amniotic fluid (MSAF), foul smelling liquor, low birth weight, prematurity and low Apgar score at birth were identified as the major maternal and neonatal risk factors for neonatal sepsis by a study carried out by Shah GS et al.<sup>9</sup> Positive blood cultures were found in 22% of cases. *S. aureus* and *Klebsiella* were the most common microorganisms that were isolated in the cultures. The general mortality was 11%. There was no difference of incidence of risk factors among culture positive and culture negative cases. In the presence of above mentioned risk factors, the newborn should be screened and observed for sepsis and considered for early administration of antibiotics.

Another study carried out in North Ethiopia in 2015 by Destaalem Gebremedhin and others<sup>10</sup> determined the risk factors of neonatal sepsis in public hospitals and found out that out of 78 cases included in the study, more than 76.8% of cases had early onset sepsis. The possible risk factors of neonatal sepsis in this study were; history of maternal urinary tract infection or sexually

transmitted infection, delivery out of health center, PROM, intrapartum fever, APGAR score <7 at 5th minute and not crying immediately at birth. An untreated urinary tract infection (UTI) or birth canal infection may lead to PROM. Other risk factors include bleeding from uterus during pregnancy, heavy cigarette smoking in pregnancy and previous preterm delivery. More than 24 hours duration with ruptured membranes without other complications before delivery is associated with a 1% increase in the incidence of neonatal sepsis; however, incidence of neonatal infection is increased significantly when chorioamnionitis is associated with rupture of membranes.

The most important predictors of subsequent neonatal infection after PROM are clinical chorioamnionitis and maternal colonization with GBS as demonstrated by a multi-center study.<sup>11</sup> Seaward et al<sup>12</sup> found that an important but common risk factor is more than 6 vaginal digital examinations, has high association with neonatal infection. Furthermore, Preterm infants are more likely to need invasive procedures, like umbilical catheterization and endotracheal intubation. Premature newborns are more likely to get infection from cytomegalovirus (CMV), hepatitis B virus (HBV), herpes simplex virus, *Mycobacterium tuberculosis*, *Toxoplasma*, *Campylobacter fetus* and *Listeria* species. CMV infection and toxoplasmosis also give rise to low birth weight and intrauterine growth retardation. There is less immunologic ability to resist and combat infection in premature infants. Eventually, they are more prone to infection by common organisms such as coagulase negative *Staphylococcus*. Vertical transmission through ascending contaminated amniotic fluid or during spontaneous vaginal delivery from bacteria in the mother's lower genital tract is a common cause of early-onset

infection.<sup>13</sup> Maternal chorioamnionitis and group B streptococcal (GBS) colonization are well-recognized risk factors for early-onset neonatal sepsis.<sup>14</sup> Finally, the results of our study have much importance in our population as they may help the pediatricians and patients to control the morbidity and mortality from Neonatal sepsis by controlling these risk factors.

**CONCLUSION**





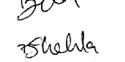
PROM is a leading maternal risk factors followed by meconium stained liquor and preterm delivery in diagnosed cases of early neonatal sepsis.

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**AUTHORSHIP AND CONTRIBUTION DECLARATION**

Sr. #	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Faraz Ahmed	Conception, Design, Article writing.	
2	Mohsin Ali	Data collection and analysis.	
3	Hussan Ali Sarwar	Data collection and analysis.	
4	Miqdad Haider	Data analysis and interpretation.	
5	Muhammad Bilal Safdar	Literature review and Proof read.	
6	Shehla Usman	Data collection, Proof read.	