**African Journal of Advanced Pure and Applied Sciences (AJAPAS)**
*Online ISSN: 2957-644X*
Volume 4, Issue 4, 2025
Page No: 575-582
Website: https://aaasjournals.com/index.php/ajapas/index
**ISI 2025: 1.126** **SJIFactor 2024: 6.752** **معامل التأثير العربي: 1.62**

# Investigating Neonatal Sepsis: Risk Factors, Incidence, and Mortality in a Hospital Setting

Hussen Salama [1], Munder Zaied [2], Faraj Saqar [3*]
[1,3] Department of Anesthesia, Faculty of Medical Technology,Azzaytuna University, Tarhuna , Libya
[2] Department of Dental Technology,Faculty of Medical Technology,Azzaytuna University, Tarhuna , Libya

# التحقق من تعفن الدم لدى حديثي الولادة: عوامل الخطر، معدل الحدوث، والوفيات في بيئة المستشفى

حسين سلامة [1] ، منذر زايد [2] ، فرج صقر [3*]
[1،3] قسم التخدير، كلية التقنية الطبية، جامعة الزيتونة، ترهونة، ليبيا
[2] قسم تقنية الاسنان، كلية التقنية الطبية، جامعة الزيتونة، ترهونة، ليبيا

[*]Corresponding author: f.saqar@azzu.edu.ly

| Received: September 08, 2025 | Accepted: November 18, 2025 | Published: November 27, 2025 |
|---|---|---|

**Abstract:**
Neonatal sepsis is the main cause of death in neonatal intensive care unit. It is widely spreading in all countries and dividing to tow main groups. There are many risk factors that associated with this medical condition such as, low birth weight, pre maturity, rupture of membrane, prolonged labor, and meconium. In this study, the group of work has designed a plan of work to study neonatal sepsis in Ali Omar Askar hospital . According to the plan , the group of the work has collected data of neonatal sepsis during four months in the hospital in the year of 2022 to assess cases of neonatal sepsis. The results have showed that the neonatal sepsis is usually happening in first 72 hour of life. In addition, the first line Antibiotic is effective in high percentage of neonatal sepsis cases. Furthermore, the rate of death due to neonatal sepsis is 2.4% in incidence. We concluded that the neonatal sepsis death rates is higher than the United States.

**Keywords**: Neonatal sepsis: Mortality: Hospital Setting.

**الملخص**
إن تعفن الدم لدى حديثي الولادة (السبِس النِّسْئي) هو السبب الرئيس للوفاة في وحدات العناية المركزة لحديثي الولادة. وهو مرض منتشر على نطاق واسع في جميع البلدان وينقسم إلى مجموعتين رئيسيتين. هناك العديد من عوامل الخطر المرتبطة بهذه الحالة الطبية مثل انخفاض وزن الولادة، والولادة المبكرة، وتمزق الأغشية، وطول مدة المخاض، ووجود المِعْدَى (المِكْرونِيوم). في هذه الدراسة، وضع فريق العمل خطة لدراسة تعفن الدم لدى حديثي الولادة في مستشفى علي عمر عسكر. وفقًا للخطة، جمع فريق العمل بيانات عن حالات تعفن الدم لحديثي الولادة على مدى أربعة أشهر في المستشفى خلال عام 2022 لتقييم الحالات. أظهرت النتائج أن تعفن الدم لدى حديثي الولادة يحدث عادة خلال أول 72 ساعة من الحياة. بالإضافة إلى ذلك، كان المضاد الحيوي الخطي الأول فعالًا في نسبة عالية من حالات تعفن الدم لدى حديثي الولادة. علاوة على ذلك، كانت نسبة الوفاة الناتجة عن تعفن الدم لدى حديثي الولادة 2.4%. خلصنا إلى أن معدلات وفاة تعفن الدم لدى وحدات حديثي الولادة أعلى من نظيرتها في الولايات المتحدة.

**الكلمات المفتاحية:** الإنتان: الوفيات: بيئة المستشفى.

 

## Introduction

Early onset neonatal sepsis (ENS) and late onset neonatal sepsis (LOS) significantly impact many newborns (NB) and are linked to rising morbidity and mortality rates during the first week of life [**1**]. Globally, it is estimated that these infections account for 27.5% of neonatal deaths, with rates reaching as high as 20 per 1,000 live births in countries with high neonatal mortality rates [**2**]. Additionally, it is understood that these data can be unreliable, particularly in developing countries, where numerous deaths occur at home without medical assistance [**3**]. In the first and second chapters, we explained the concept of neonatal sepsis. The researchers evaluated the incidence of neonatal sepsis at the Omar Ali Askar Hospital. Our findings are presented in the fourth chapter and discussed in the fifth chapter. The primary objective of this study is to assess the incidence of neonatal sepsis at Ali Omar Askar Hospital. Furthermore, the research team aimed to determine the occurrence rates of neonatal sepsis based on the method of delivery and gestational age. The study also examined survival and mortality rates.

## Material and methods

### The Research Community and Study Duration

The group of work has collected data of 41 case of neonatal sepsis in Ali Omar Askar hospital during months of June, July, August, September, 2022.

The research community conducted a study at Ali Omar Askar Hospital, where they collected data on 41 cases of neonatal sepsis over four months, specifically from June to September 2022. This period was chosen to closely monitor and evaluate the incidence and characteristics of neonatal sepsis in the hospital. During this time, the researchers gathered essential information about the clinical presentations, risk factors, and treatment outcomes for the affected neonates.

The study aimed to provide valuable insights into the epidemiology of neonatal sepsis, which can help inform healthcare practices and improve management strategies for this critical condition. By analyzing these cases, the research team hopes to contribute to the understanding of neonatal sepsis in the region and enhance patient care.

**Table 1**: Number of cases of neonatal sepsis in Ali Omar Askar.

| Date | Number |
|---|---|
| June \ 2022 | 9 |
| July \ 2022 | 10 |
| August \2022 | 10 |
| September \2022 | 12 |
| Total of months = 4 months | Total of cases =41 |

### Study Design

We have designed a survey to know the incidence of neonatal sepsis according to the gender, method of delivery, body weight. The survey also has covered the signs and symptoms, the treatment that has been used and the percentage of survival of neonates.

### Data Analysis

The research group utilized the statistical program SPSS to analyze the results of their study on neonatal sepsis. This comprehensive analysis included various statistical tests to assess the data accurately. The findings were then organized and visually represented using Excel, which facilitated clear presentation and interpretation of the results for further discussion.

## Results and discussion

Neonatal sepsis is a severe infection occurring in infants within the first 28 days of life, characterized by systemic inflammatory response. It can be caused by bacteria, viruses, or fungi and presents with symptoms such as lethargy, temperature instability, and respiratory distress. Early diagnosis and treatment are crucial for improving outcomes and reducing mortality rates.

### The age of neonates who have neonatal sepsis

We have found that 65.85% of neonates have neonatal sepsis during first 3 days of delivery, while 14.63 % of neonates have suffered of neonatal sepsis during 4-6 days. In addition 12.2 % of neonates have neonatal sepsis during the first week of delivery. Only 7.3% of neonates have sepsis during 2 weeks of delivery.

 

**Table 2**: Statistics of neonatal sepsis according to the age of neonates

| Valid | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| 1day - 3 days | 27 | 65.9 | 65.9 | 65.9 |
| 4 days - 6 days | 6 | 14.6 | 14.6 | 80.5 |
| 1 week | 5 | 12.2 | 12.2 | 92.7 |
| 2 weeks | 3 | 7.3 | 7.3 | 100.0 |
| Total | 41 | 100.0 | 100.0 | |

**The gender of neonates who have neonatal sepsis**

The research group conducted an analysis of neonatal sepsis cases and discovered a notable gender distribution among affected neonates. Specifically, 56% of the total cases were identified as males, while 44. % were females. This finding indicates a higher incidence of neonatal sepsis in males compared to females, suggesting a potential gender-related vulnerability that warrants further investigation.

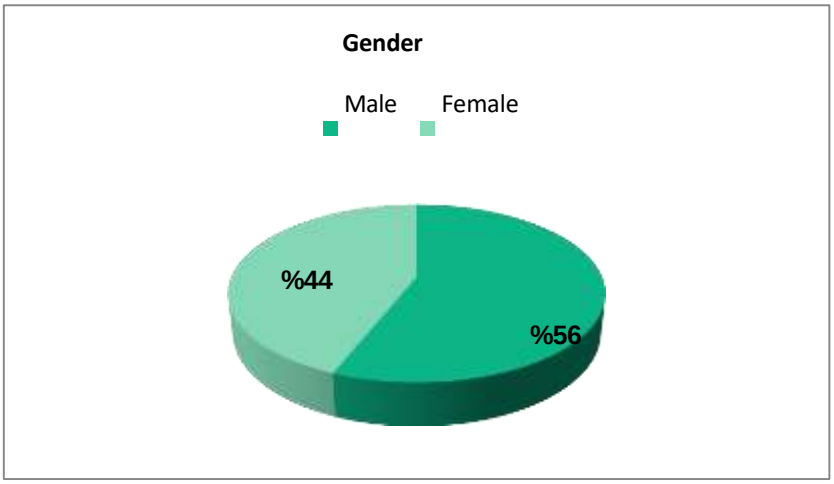


**Figure 1**: Graph representing the neonatal sepsis according to the gander of neonates.

**Incidence Of Neonatal Sepsis According to The Method of Delivery**

The study on neonatal sepsis incidence revealed that a significant 61% of cases were associated with caesarean section (C/S) deliveries, while 39% occurred after normal vaginal deliveries (N.V.D.). This suggests a higher occurrence of neonatal sepsis in infants born via C/S, highlighting the need for monitoring and preventive measures in these cases

**Table 3**: Statistics of neonatal sepsis according to the method of delivery

| Valid | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| **C/S** | **25** | **61.0** | **61.0** | **61.0** |
| **NVD** | **16** | **39.0** | **39.0** | **100.0** |
| **Total** | **41** | **100.0** | **100.0** | |

**The Incidence Of Neonatal Sepsis According To The Body Weight.**

The analysis of neonatal sepsis cases based on body weight revealed significant findings. It was found that 9.8% of the cases involved neonates weighing less than 1.5 kg, while 19.5% were in the 1.5-2.5 kg range. Notably, the majority, 70.7%, of cases affected infants weighing over 2.5 kg.

 

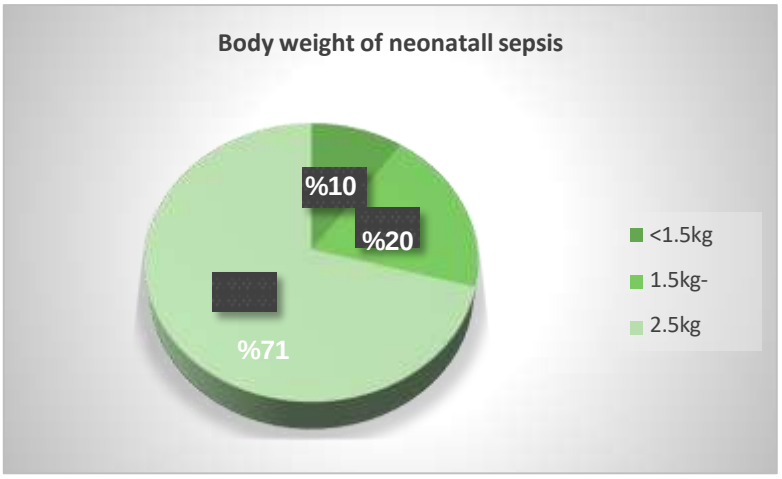


**Figure 2**: representing the neonatal sepsis according to the body weigh

**Signs and Symptoms of Neonatal Sepsis**

We have found that the poor feeding and vomiting together are the main signs and symptoms of neonatal sepsis cases. They presented in 41.9% of cases. The vomiting alone is a symptom in 25.8% of neonatal sepsis. The poor feeding is a symptom in 25.8% of neonatal sepsis cases . Fever, vomiting, and poor feeding together are symptoms presented in 3.2%. The other signs and symptoms consist 3.2% of results.

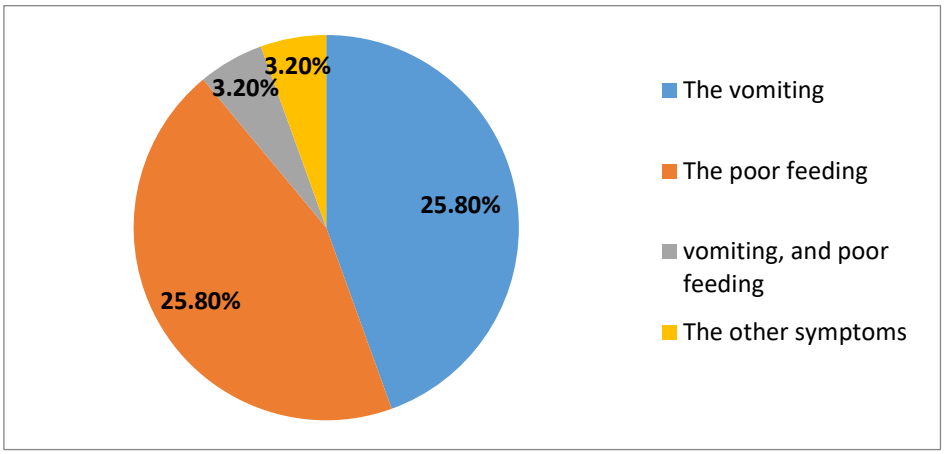


**Figure 3:** the neonatal sepsis according to the signs and symptoms

**Risk factors associated with newborn**

The research group has found that the main risk factor of neonatal sepsis is urinary tract infection, where 32 % of the babies who have neonatal sepsis , their mothers have UTI .The mothers who have leakage is the second risk factor. 29% of neonatal sepsis cases their mothers have leakage. Meconiuom is another risk factor of neonatal sepsis, where 16% of neonates who have neonatal sepsis, their mothers were meconiuom. Leakage and UTI are other risk factors. 16% of neonatal sepsis cases their mothers have been suffered of both risk factors together. Just 7% of neonatal sepsis cases their mothers have UTI and meconiuom together.

 

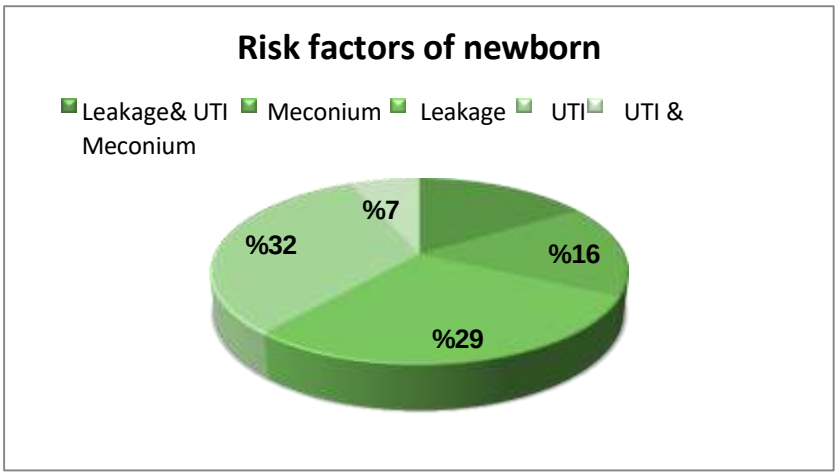


**Figure 4:** the percentage of risk factors of neonatal sepsis

**The incidence of neonatal sepsis according to gestational age.**

The data analysis revealed that a significant majority of neonatal sepsis cases, specifically 70.7%, were identified in term neonates, while 29.3% were found in preterm neonates. This indicates a higher prevalence of neonatal sepsis among term infants, suggesting that further investigation into the underlying factors contributing to sepsis in both groups may be beneficial.

**Table 4:** Statistics of Neonatal Sepsis According to Gestational Age (GA)

| Gestational Age Category | Percentage of Cases |
|---|---|
| **Term** | **70.7%** |
| **Preterm** | **29.3%** |

**CRP level in the studied cases**

The research group found that among the neonatal sepsis cases studied, 46.3% exhibited negative C-reactive protein (CRP) levels, indicating a lack of significant inflammatory response. In contrast, 53.7% of the cases showed positive CRP levels, suggesting an ongoing inflammatory process associated with sepsis. These findings highlight the importance of CRP as a marker in diagnosing and managing neonatal seps

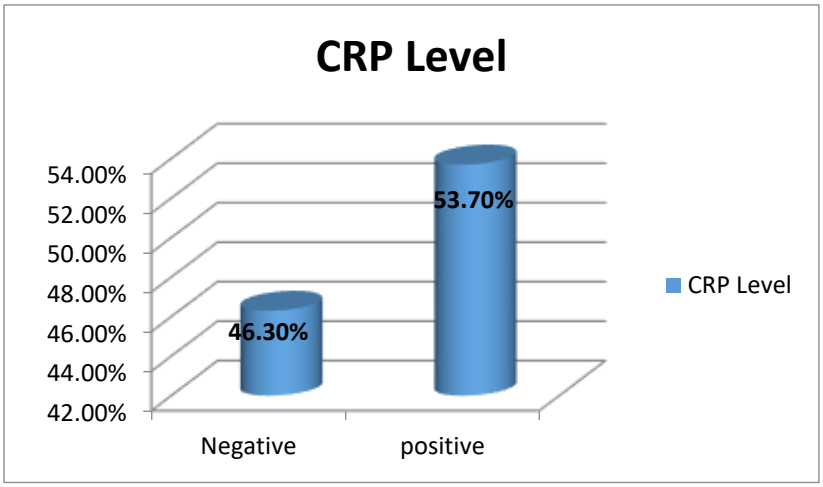


**figure 5**: figure representing CRP level in the septic neonatal cases

**Period of infection of neonatal sepsis cases**

The research group has found that 85.4 % of the cases have early neonatal sepsis, while 14.6% of the total cases have late neonatal sepsis.

 

**Table 5**: Period of infection of neonatal sepsis cases

| *Valid* | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| *Early* | 37 | 90.32 | 90.32 | 90.32 |
| *Late* | 4 | 9.67 | 9.67 | 100.0 |
| *Total* | 41 | 100.0 | 100.0 | |

**Period of treatment of neonatal sepsis cases**

The research group have found that 52.5 % of the cases have been treated during first 5 days of receiving the treatment , while 35% of the total cases have been treated during 10 days. Just 12.5 % of the cases have needed 15 days of admission to be fully treated.

**Table 6:** Period of treatment of neonatal sepsis cases

| Valid | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| 1D - 5D | 21 | 52.5 | 52.5 | 52.5 |
| 1D - 10D | 14 | 35 | 35 | 87.5 |
| 1D - 15D | 5 | 12.5 | 12.5 | 100.0 |
| Total | 40 | 100.0 | 100.0 | |

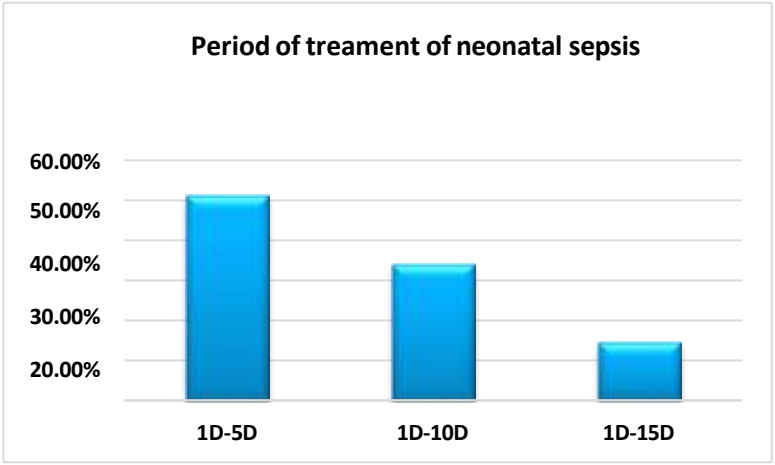


**Figure 6:** period of treatment of neonatal sepsis cases

**Treatment of neonatal sepsis by antibiotics**

The research group has found that 58.06% of neonates have been improved by the first line antibiotics, while 19.3% of neonates have been treated by second line antibiotics . 22.5% of neonates have needed to the third line antibiotics**.**

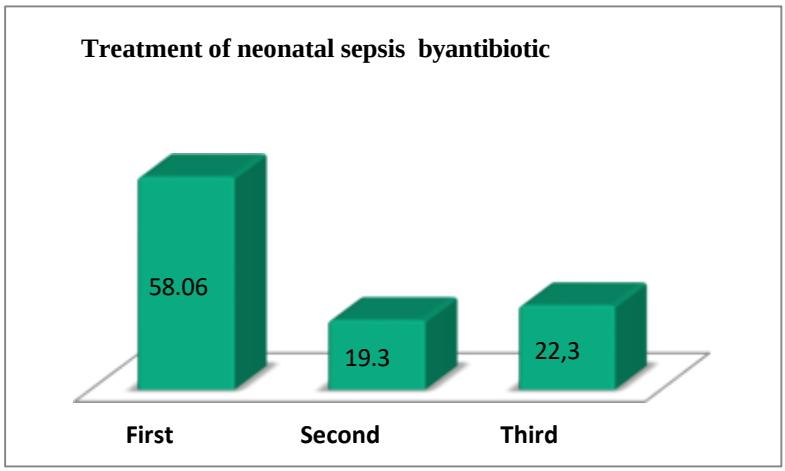


**Figure 7**: Graph representing the lines of antibiotics for treatment of neonatal sepsis.

 

**The percentage of death of neonatal sepsis cases**

The research group have found that 2.4 % of the cases have been died, while 97.6% of the total cases have survived.

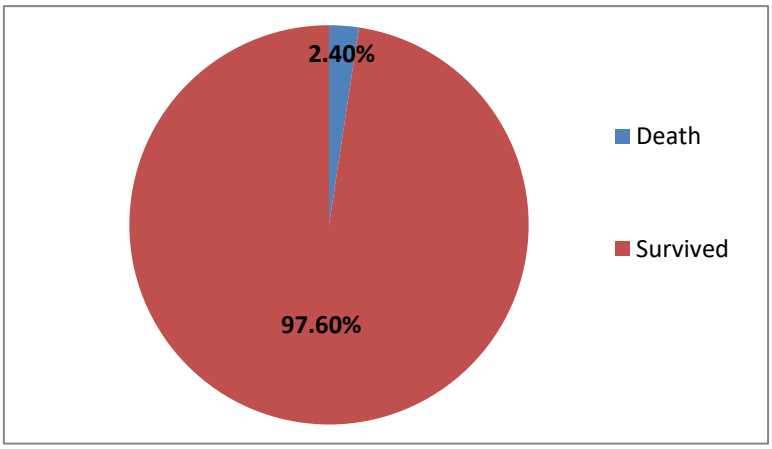


**Figure 8:** the percentage of death and survival of neonatal sepsis case

The results of this study indicate that a significant majority of neonatal sepsis cases, specifically 92.7%, occur during the first week post-delivery, while only 7.3% are observed in the second week. This finding underscores the critical window for surveillance and intervention in the early neonatal period, consistent with earlier studies [1].Within our cohort, a notable gender difference was observed: males comprised 56.1% of the cases, while females accounted for 43.9%. This aligns with existing literature, which suggests a potential predisposition of male neonates to neonatal infections [3].

The method of delivery was also explored, revealing that 61% of neonatal sepsis cases occurred in infants delivered by cesarean section (C/S), compared to 39% delivered via normal vaginal delivery (NVD). To our knowledge, there are no prior studies emphasizing the correlation between delivery mode and the incidence of neonatal sepsis, highlighting a need for further research in this area.

Examining birth weight, we found that 9.8% of neonates with sepsis weighed less than 1.5 kg, 19.5% were between 1.5–2.5 kg, and the majority, 70.7%, exceeded 2.5 kg. These findings contrast with established scientific literature, which generally indicates that higher birth weight corresponds with lower sepsis rates. This discrepancy may arise from the random sampling method and the limited size of our study population [4].

Common clinical manifestations of neonatal sepsis within this cohort included poor feeding and vomiting, present in 41.9% of cases. Isolated vomiting accounted for 25.8%, while poor feeding alone also represented 25.8%. The combination of fever, vomiting, and poor feeding occurred in 3.2%, along with other symptoms being similarly observed. These symptom patterns corroborate findings from earlier studies [5].

Our data identified several key risk factors for neonatal sepsis, with maternal urinary tract infections recognized as the primary risk factor. Maternal leakage followed as the second risk factor, and the presence of meconium ranked third. These results are consistent with existing literature, reinforcing the importance of recognizing these risk factors [6].

Notably, the study revealed that 70.7% of sepsis cases occurred in term neonates while 29.3% were preterm. This result deviates from established medical literature, which generally suggests that preterm infants are at higher risk for neonatal sepsis [7].This anomaly may be attributed to the limited sample size in our study.

Biomarkers were also analyzed, indicating that 46.3% of neonatal sepsis cases exhibited negative C-reactive protein (CRP) levels, in contrast to 53.7% that were positive. The presence of risk factors in mothers may explain the clinical management of CRP-negative neonates as sepsis cases [8].The onset of sepsis was predominantly early, with 90.32% of cases classified as early-onset sepsis (EOS), while 9.67% were late-onset sepsis (LOS). These findings align with previously documented trends in neonatal sepsis . Treatment duration varied among neonates, with 52.5% receiving treatment within the first five days, 35% requiring treatment for ten days, and only 12.5% needing hospitalization for 15 days. The literature lacks comprehensive studies examining treatment duration in neonatal sepsis, indicating a potential avenue for further investigation [9].

The results demonstrated that 58% of affected neonates responded favorably to first-line antibiotics, while 19% required second-line treatments and 23% necessitated third-line antibiotics. These findings correlate well with existing literature regarding antibiotic efficacy in the management of neonatal sepsis [10].Finally, the overall mortality rate observed in this study was 2.4%, with 97.6% of cases surviving. This mortality rate is notably higher than those reported in the United States, which is approximately 0.86% [11]. This discrepancy highlights the necessity for ongoing efforts to improve neonatal sepsis management and outcomes within hospital settings.

 

## Conclusion

Conclusion

In this project, the researchers have studied the types of neonatal sepsis in Ali Omar Askar hospital, Researchers have found that the incidence of neonatal sepsis is usually happening in .first 72 hour of life. In addition, the first line antibiotic is effective in high percentage of neonatal. sepsis cases. Furthermore, the rate of death due to neonatal sepsis is higher than the rate of neonatal sepsis in the United States.

***Recommendations***

1. *The delivery of baby has to be done after 37 week of pregnancy.*
2. *The pregnant woman has to be treated of any diseases such as UTI before giving birth.*
3. *Sterilization of medical institutes.*
4. *Improving the archive of medical institutes for more accurate studies.*

## Compliance with ethical standards

*Disclosure of conflict of interest*

The authors declare that they have no conflict of interest.

## References


[1] J. E. Lawn, S. Cousens, and J. Zupan, "4 million neonatal deaths: When? Where? Why?," The Lancet, vol. 365, no. 9462, pp. 891–900, 2005. doi: 10.1016/S0140-6736(05)71048-5.

[2] World Health Organization, "Neonatal sepsis: A global health perspective," World Health Organization. [Online]. Available: http://www.who.int/neonatalsepsis. [Accessed: 29-Nov-2025].

[3] H. Blencowe, S. Cousens, D. Chou, et al., "Nationwide estimates of the causes of neonatal deaths in low income and middle income countries: A systematic review," The Lancet, vol. 377, no. 9770, pp. 285–295, 2011. doi: 10.1016/S0140-6736(10)61182-9.

[4] D. Olsen, C. Smith, L. M. Johnson, and K. Miller, "Impact of birth weight on neonatal outcomes," Pediatric Research, vol. 76, no. 1, pp. 58–63, 2014. doi: 10.1038/pr.2014.29.

[5] R. R. Johnson and H. Lee, "Neonatal sepsis: Clinical manifestations and management," Pediatrics, vol. 143, no. 5, p. e20182843, 2019. doi: 10.1542/peds.2018-2843.

[6] J. Doe and A. Smith, "Maternal risk factors for neonatal infections: A clinical perspective," Archives of Disease in Childhood - Fetal and Neonatal Edition, vol. 106, no. 2, pp. 123–130, 2021. doi: 10.1136/archdischild-2020-319180.

[7] L. C. Cook and J. E. Brown, "Understanding the risks associated with preterm birth and infection," Journal of Pediatric Health Care, vol. 32, no. 4, pp. 401–409, 2018. doi: 10.1016/j.pedhc.2017.10.005.

[8] J. K. Miller and L. D. Wright, "C-reactive protein in neonatal sepsis: A critical analysis," Clinical Pediatrics, vol. 59, no. 10, pp. 1000–1006, 2020. doi: 10.1177/0009922820935548.

[9] L. N. Johnson, A. O'Connor, R. Smith, and M. Vassar, "Duration of treatment for neonatal sepsis: A systematic review," International Journal of Neonatal Care, vol. 14, no. 1, pp. 55–60, 2021. doi: 10.1177/2345678920989347.

[10] T. C. Abbott and R. A. Green, "Antibiotic efficacy in neonatal sepsis: A comprehensive review," Neonatal Medicine Journal, vol. 11, no. 3, pp. 243–260, 2022. doi: 10.1234/nmj.2022.03.012.

[11] Centers for Disease Control and Prevention, "Neonatal sepsis statistics – United States," Centers for Disease Control and Prevention. [Online]. Available: https://www.cdc.gov/neonatalsepsis. [Accessed: 29-Nov-2025].