

## Frequency Of Neonatal Sepsis Among Neonates Presenting With Seizures

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<sup>1,3,5,6</sup> Conception of study

<sup>1</sup> Experimentation/Study conduction

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### Article Processing

Received: 02/09/2021

Accepted: 15/10/2022

**Cite this Article:** Imran, A., Rehman, S.-U.-., Qadir, I., Sheikh, K., Bibi, R., & Idrees, M. (2023). Frequency Of Neonatal Sepsis Among Neonates Presenting With Seizures. *Journal of Rawalpindi Medical College*, 27(1). DOI: <https://doi.org/10.37939/jrmc.v27i1.1769>

**Conflict of Interest:** Nil

**Funding Source:** Nil

## Abstract

**Background:** Neonatal seizures may be the first and sometimes the only clinical symptom of neonatal central nervous system disease. Neonatal seizures may indicate an underlying treatable cause. Therefore, the identification of neonatal seizures is important in the management of high-risk newborns.

**Objective:** To determine the frequency of neonatal sepsis among neonates presenting with seizures.

**Settings:** Department of child health, Hayatabad Medical Complex, Peshawar.

**Duration:** 6 months 13/10/2018 to 13/4/2019.

**Study Design:** Descriptive (cross-sectional) study.

**Material and methods:** In this study, a total of 195 patients were observed. All neonates were subjected to detailed clinical examinations like general physical, neurological examinations and detailed systemic examination, and a complete set of baseline investigations. From all neonates, 5cc of venous blood was obtained under a strict aseptic technique and was sent to the hospital laboratory for measuring the TLC, Absolute neutrophil count, CRP, and platelet count to confirm the presence or absence of neonatal sepsis.

**Results:** In this study, the mean age was 10 days with a standard deviation of  $\pm 8.36$ . Fifty-eight percent of neonates were male while 42% of neonates were female. Moreover, 42% of neonates had neonatal sepsis while 58% of neonates didn't have neonatal sepsis.

**Conclusion:** Our study concludes that the frequency of neonatal sepsis was 42% among neonates presenting with seizures.

**Keywords:** neonatal sepsis, fever, seizure, morbidity, mortality.

## Introduction

Neonatal seizures may be the first and sometimes the only clinical symptom of neonatal central nervous system disease. Neonatal seizures may indicate an underlying treatable cause. Therefore, the identification of neonatal seizures is important in the management of high-risk newborns.<sup>1</sup> Most neonatal seizures occur in only a few days, and less than half of affected neonates have seizures later in life. Such infantile seizures may be considered an acute (acute symptomatic) reaction, and therefore the term neonatal epilepsy is not used to describe seizures in infants<sup>2</sup>.

Despite the estimated incidence of neonatal seizures being notably high (1 to 3.5 per 1000 births in term infants, even higher in preterm infants' situation) its clinical management and diagnosis can be already challenging<sup>3</sup>. In the United States, the incidence of neonatal seizures has not been clearly established, although some have suggested an estimated 80 to 120 occurrences per 100,000 newborns per year. The neonatal period (that is, the first 4 weeks after birth) has a higher incidence of seizures than at any other time in life<sup>4</sup>. This underlying cause may occur in the case of birth asphyxia, respiratory distress, congenital heart abnormalities, sepsis, and multiple organ failure, or as a complication of extracorporeal membrane oxygenation or congenital heart surgery, which is less common<sup>5-7</sup>.

Neonatal sepsis is the leading cause of infant mortality, and neonatal sepsis (NS) continues to raise red flags and remains a major cause of neonatal morbidity and mortality<sup>8</sup>. Neonatal sepsis is a global problem. Approximately 30 million newborns are infected each year, and 1-2 million of them die.<sup>9</sup> The mortality rate from neonatal sepsis in developing countries is 10.4%, higher than in developed countries, with a mortality rate of 0.69 per 1,000 live births<sup>10</sup>. Basically, statistics in Pakistan are not available, but in India, according to data from the National Neonatal Perinatal Database, the incidence of neonatal sepsis is 30 per thousand, which represents between 30 and 50% of all neonatal deaths in developing countries. By taking an active approach to this disease, this sepsis-related death rate can be reduced<sup>11</sup>.

Neonatal sepsis is a systemic inflammatory response to the infection process, with nonspecific signs and symptoms or focal signs of infection. It has life-threatening complications involving major organ

systems, such as cerebral edema or thrombosis, adrenal hemorrhage, bone marrow dysfunction, and diffuse intravascular coagulation<sup>12</sup>. If left untreated, the mortality rate is high. Therefore, for non-specific initial manifestations, a high degree of suspicion should always be maintained for early diagnosis and good results.<sup>13</sup> In one study, among all cases of neonatal seizures, 32% had respiratory tract infection, 46.6% had neonatal sepsis, 8% had neonatal encephalopathy and 5% had hypocalcemia<sup>14</sup>. Since no such research has been done in the last five years on our population. Therefore, this study aims to determine the frequency of neonatal sepsis in neonates with seizures. This study will provide us with the most recent and up-to-date information on the prevalence of neonatal infections in our population. The results of this study will be shared with local pediatricians and suggestions will be given regarding future research recommendations.

## Materials and Methods

In this study, a total of 195 patients were observed. All neonates were subjected to detailed clinical examinations like general physical, neurological examinations and detailed systemic examination, and a complete set of baseline investigations. From all neonates, 5cc of venous blood was obtained under a strict aseptic technique and was sent to the hospital laboratory for measuring the TLC, Absolute neutrophil count, CRP, and platelet count to confirm the presence or absence of neonatal sepsis.

**Settings:** Department of Child Health, Hayatabad Medical Complex, Peshawar.

**Study Design:** Cross-Sectional.

**Duration of study:** Six months 13/10/2018 to 13/4/2019.

**Sample Size:** The sample size was 195 keeping 46.6%<sup>14</sup> proportion of neonatal sepsis among neonates with seizures, 95% confidence interval, and 7% margin of error using the WHO sample size estimation formula.

**Sample technique:** Consecutive non-probability sampling.

### SAMPLE SELECTION

#### Inclusion criteria:

- All neonates are present with neonatal seizure (any duration within the first 28 days of life).
- From birth to 28 days of life.
- Either gender

**Exclusion criteria:**

- History of use of anticonvulsants.
- All neonates with diagnosed muscular dystrophy on clinical examination.
- Renal or Hepatic diseases on medical records and relevant investigations.

The above-mentioned conditions act as confounders and if included had introduced bias in the study results.

**DATA COLLECTION PROCEDURE**

The study was conducted after permission is obtained from the hospital’s ethical committee. All cases of neonatal seizures (as per operational definitions above) and inclusion criteria were enrolled in the study through OPD and nursery at Hayatabad Medical Complex Peshawar. The purpose and benefits of the study were explained to the parents of all neonates and if agreed upon informed written consent was obtained. All neonates were subjected to detailed clinical examinations like general physical, neurological examinations and detailed systemic examination, and a complete set of baseline investigations. From all neonates, 5cc of venous blood was obtained under a strict aseptic technique and was sent to the hospital laboratory for measuring the TLC, Absolute neutrophil count, CRP, and platelet count to confirm the presence or absence of neonatal sepsis. All the above-mentioned information including name, age, gender, birth asphyxia, duration of seizures, birth weight and period of gestation was recorded in a pre-designed proforma. Strict exclusion criteria had been followed to control confounders and bias in the study results.

**DATA ANALYSIS**

Data were analyzed using SPSS version 22. Quantitative variables like age, duration of seizures, birth weight, and period of gestation were described in terms of means + standard deviation. Categorical data like gender, birth asphyxia, and neonatal sepsis were presented in terms of frequency and percentages. Neonatal sepsis was stratified among age, gender, birth asphyxia, duration of seizures, birth weight, and period of gestation to see the effect modifications using a chi-square test keeping a p-value of < 0.05 as significant. All results were presented as tables and diagrams.

**Results**

This study analyzed the age distribution of 195 newborns, of which 117 (60%) newborns were within

the 2-10-day age range, 55 (28%) newborns were within the 11-20-day age range and 23 (12%) newborns in the 21-28-day age range. The average age is 10 days, the standard deviation is ± 8.36 (Table 1). Analyzed the gender distribution of 195 newborns, including 113 males (58%) and 82 females (42%). Duration of seizures among 195 neonates was analyzed as 121(62%) neonates had a duration of seizures ≤5 minutes while 74(38%) neonates had a duration of seizures >5 minutes. The mean duration of seizures was 5 minutes with a standard deviation ± 2.114 (table 2). Birth weight among 195 neonates was analyzed as 127(65%) neonates had birth weights of 2.5-3 kg while 68(35%) neonates had 97 birth weights of 3.1-3.5 kg. The mean birth weight was 3 Kg with a standard deviation ± 1.37 (table 3). The period of gestation among 195 neonates was analyzed as 152(78%) neonates had POG 37-39 weeks while 43(22%) neonates had POG 39-42 weeks. The mean POG was 37 weeks with a standard deviation ± 4.73. Birth asphyxia among 195 neonates was analyzed as 105(54%) neonates had birth asphyxia while 90(46%) neonates didn’t have birth asphyxia (table 4). Neonatal sepsis among 195 neonates was analyzed as 82(42%) neonates had neonatal sepsis while 113(58%) neonates didn’t have neonatal sepsis (table 5).

**Table 1: Age distribution (n=195)**

Age	Frequency	Percentage
2-10 days	117	60%
11-20 days	55	28%
21-28 days	23	12%
Total	195	100%

**Table 2: Duration of Seizures (n=195)**

Duration	Frequency	Percentages
≤ 5minutes	121	62%
>5 minutes	74	38%
Total	195	100%

**Table 3: Birth Weight (n=195)**

Birth Weight	Frequency	Percentages
2.5-3kg	127	65%
3.1-3.5kg	68	35%
Total	195	100%

**Table 4: Birth Asphyxia (n=195)**

Birth asphyxia	Frequency	Percentages
Yes	105	54%
No	90	46%
Total	195	100%

**Table 5: Neonatal Sepsis (n=195)**

Neonatal Sepsis	Frequency	Percentages
Yes	82	42%
No	113	58%
Total	195	100%

## Discussion

Neonatal seizures may be the first and sometimes the only clinical symptom of neonatal central nervous system disease. Neonatal seizures may indicate an underlying treatable cause. Therefore, the identification of neonatal seizures is important in the management of high-risk newborns.<sup>1</sup> Most neonatal seizures occur in only a few days, and less than half of affected neonates have seizures later in life. Such infantile seizures may be considered an acute (acute symptomatic) reaction, and therefore the term neonatal epilepsy is not used to describe seizures in infants<sup>2</sup>. Our study shows that the mean age was 10 days with a standard deviation  $\pm 8.36$ . Fifty-eight percent of neonates were male while 42% of neonates were female. Moreover, 42% of neonates had neonatal sepsis while 58% of neonates didn't have neonatal sepsis. Similar results were seen in another study conducted by Shah BA et al<sup>15</sup> in which 32% had respiratory tract infection, 46.6% 112 had neonatal sepsis, 8% had neonatal encephalopathy and 5% had hypocalcemia. In another study conducted by Bhagat Ret al<sup>16</sup> the annual incidence of LOS meningitis has been reported to be 16. Most of the patients (46.1%) appeared in the 37-day age group. The average birth weight of the newborn was  $2.61 \pm 0.606$  kg. 60.3% of neonates with meningitis had low birth weight (P 0.005). Among meningitis cases, 100 patients were drowsy; seizures accounted for 92.8%, and fever accounted for 50%. 42.6 cases of meningitis had positive blood cultures. Meningitis occurred in 60.7% of confirmed Gram-negative sepsis, while in 30.7% of confirmed Gram-positive sepsis (P <0.005). The recovery rate of meningitis neonates who were exclusively breastfed was 94.5% and the mortality rate was 6.3%, while the corresponding figures for the other feeding groups were 77% and 22.4% (P <0.005). In another study conducted by Talebian et al<sup>17</sup>, the overall incidence of seizures has been reported to be 2.6 per 1,000 live births. 59% of seizures occur in the first three days of life. The etiology of seizures is hypoxic-ischemic encephalopathy (HIE) (36%),

hyponatremia (12%), hypoglycemia (11%), intracranial hemorrhage (11%), infection (10%), low calcium (8%), metabolic disorders (7%), structural abnormalities (5%), hypomagnesemia (4%), neonatal sepsis (45%). In 23% of neonates, no specific etiology was found and 23% had multiple etiologies. 45% of newborns have not had an EEG. The types of seizures were focal clonus (26%), tonic (25%), multifocal clonus (34%), mild (11%), and myoclonus (4%). The type of seizure has nothing to do with the secondary clinical findings. Neonatal seizures are common and HIE is the leading cause of seizures in this study. Neonatal seizure clinical evaluation needs to be improved. Similar results were seen in another study by Hallberg B et al., In which the frequency of sepsis in newborns with seizures was 38%.

## Conclusion

Our study concludes that the frequency of neonatal sepsis was 42% among neonates presenting with seizures.

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