

PREVALENCE, AETIOLOGY AND MANAGEMENT OF NEO-NATAL SEPSIS IN THE SPECIAL CARE BABY UNIT OF A TEACHING HOSPITAL IN SOUTH-WEST NIGERIA**BY****Aluko, Joel Ojo: Department of Nursing Sciences, University of Ilorin;
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E-mail: niyiolowolafe2@gmail.com****Abstract**

Neonatal sepsis is one of the most common reasons for admission to neonatal intensive care units in developing countries. It is also a major cause of mortality in both developed and developing countries. This retrospective descriptive study assessed the prevalence, aetiology and management of neonatal sepsis in a teaching hospital in South-West, Nigeria. A checklist was used by the researchers to collect data from the records. Data were cleaned, coded and analyzed using the SPSS version 20. Data were presented using frequency tables, while the chi-square was used to test the hypotheses at $p \leq 0.05$ level of significance. Results from the study indicate that half of the children admitted were out born, and 81.6% had neonatal sepsis on admission. Moreso, results show that 81.2% initiated breastfeeding, while 16.4% were fed by tube. However, 10.1% of the babies died. Also, results from the study indicate that the greater proportion of the neonates, 51.2% were out-born, while 17.9% were admitted from private hospitals and home, respectively. In addition, 23.2% of the women delivered via elective caesarean section. Results from the study also show that 18.4% of the participants had hypertension, while 12.1% had pre-eclampsia and 15.5% of the respondents had premature rupture of membranes, while 13.5% had prolonged labour. There is a great need to reduce morbidity and mortality associated with neonatal sepsis to the barest minimum by ensuring that women are educated on proper infection control and treatment of maternal illnesses. Conditions surrounding labour such as frequent vaginal examinations, which could lead to neonatal sepsis should also be reduced to the barest minimum in order to reduce the risks of developing neonatal sepsis.

Keywords: Neonatal Sepsis, Prevalence, Neonatal Sepsis Aetiology, Management and Special Care Baby Unit

Introduction

Neonatal sepsis is one of the most common reasons for admission to neonatal intensive care units in developing countries. It is also a major cause of mortality in both developed and developing countries (Mersha, Worku, Shibiru, Bante, Molla, Seifu, Huka, Abrham, & Teshome, 2019). Neonatal sepsis has an annual incidence of 2-6/1000 live birth in the developed countries of the world and this incidence is estimated at 3-4 times higher in developing countries. In Nigeria, neonatal sepsis incidence rates and mortality rates are among the highest in the world. This increased rate in developing countries is mainly attributable to lack of health education, poor antenatal care and lack of trained staff to conduct deliveries. Vergano, Sharland, Kazambe, Mwansambo & Health (2009) documented that neonatal infections currently cause about 1.6 million death annually in developing countries, Nigeria inclusive. Factors associated with increased incidence of neonatal sepsis include maternal urinary tract infection, pyrexia, vaginal discharge and unclean vaginal examination during labour and development of early onset neonatal sepsis.

The higher proportion of low birth weight (LBW) deliveries (up to 25%) also places these infants at increased risk for sepsis and its related mortality (Boghossian, Page, Bell, Stoll, Murray, Cotten, Shankaran, Walsh, Laptook, Newman, & Hale, 2013). Another factor contributing to high mortality is delay in taking the sick newborns to hospitals. This has placed millions of infants at great risks for complications that may arise from neonatal sepsis, including death. This study, therefore, assessed the prevalence, aetiology and management of neonatal sepsis at the Special Care Baby Unit of a selected teaching hospital (Ladoke Akintola University of Technology (LAUTECH) Teaching Hospital) in the South-West geo-political zone of Nigeria, with the aim of identifying the current rate of sepsis, the causative factors, factors that increased the prevalence, as well as strategies employed to manage neonatal sepsis in the facility.

Purpose of the Study

The study had the following objectives:

1. Measure the prevalence of neonatal sepsis in LAUTECH Teaching Hospital, Ogbomoso;
2. Identify the factors causing neonatal sepsis in neonates at the LAUTECH Teaching Hospital Ogbomoso;
3. Measure the outcomes of management of neonatal sepsis in neonates at the LAUTECH Teaching Hospital, Ogbomoso and,
4. Examine the preventive strategies for neonatal sepsis in LAUTECH Teaching Hospital, Ogbomoso.

Methodology

This retrospective descriptive study assessed the prevalence, aetiology and management of neonatal sepsis in a Teaching Hospital in the South-West of Nigeria. This involved collecting data on and discussing in a systematic manner, the characteristics, the features or facts about the given population. The study was carried out in a teaching hospital within the South-West geo-political zone of Nigeria. The hospital has twenty-six (26) wards and units with two hundred and thirty (230) beds, fourteen (14) cots and seventeen (17) incubators, providing services in all fields of medical practices. This includes internal medicine and all its clinical subspecialties, General surgery and all surgical subspecialties, Obstetrics and Gynaecology, Paediatrics, Ophthalmology, Ear, Nose and Throat (ENT), Urology, Neurosurgery and Orthopaedics and diagnostic centre to its credit. The Centre also provides training for nursing students, interns, House officers and residency training in the field of medicine. There are about 90 medical doctors and 130 nurses in the hospital. The study's population was neonates admitted into the Special Care Baby Unit of LAUTECH Teaching Hospital, Ogbomoso between 2016 and 2019.

The instrument used for this research work is a checklist containing key questions answered from data gathered from a secondary source (i.e. the Health Register of the Special Care Baby Unit of the hospital). Secondary data obtained from all past records which included case notes of neonates admitted for neonatal sepsis in Special Care Baby Unit of hospital between the years 2016 – 2019 were used for this study. Descriptive statistics of frequency counts, mean, percentages were used to present results. The Chi-square test was used to test for association and difference in mean between variables. Ethical clearance was obtained from the Research Ethical committee of the tertiary hospital, while permission was taken from the nursing officer in charge of the Special Care Baby Unit and the Record Officer to collect data from admission. Confidential and anonymity of information were strictly observed.

Results

Table 1 shows the socio-demographic characteristics of the respondents. Results from the study show that the greatest percentage of the participants, 52.2% were males, 74.9% were between ages 0-7 days, with 52.25% of young mothers at 18-34 years.

Table 1: Socio-Demographic Characteristics

| Gender | Frequency | Percent |
|---|------------------|----------------|
| Male | 108 | 52.2 |
| Female | 99 | 47.8 |
| Newborn Age Group | | |
| 0 - 7 days | 155 | 74.9 |
| 8 - 14 days | 44 | 21.3 |
| 15 - 21 days | 6 | 2.9 |
| 22 - 28 days | 2 | 1 |
| Tribes | | |
| Yoruba | 140 | 67.6 |
| Hausa | 45 | 21.7 |
| Igbo | 22 | 10.6 |
| Religion | | |
| No response | 6 | 2.9 |
| Christianity | 119 | 57.5 |
| Islam | 79 | 38.2 |
| Traditional | 3 | 1.4 |
| Mother's Age group | | |
| 18-34 Young Mother | 108 | 52.2 |
| 35-45 Elderly Mother | 99 | 47.8 |
| Mother's Educational status | | |
| No formal Education | 45 | 21.7 |
| Junior Secondary school | 13 | 6.3 |
| Senior Secondary School | 57 | 27.5 |
| OND/NCE/HND | 60 | 29 |
| University Degree(BA/B.Sc, M.Ed/MA/MSc/Ph.D) | 32 | 15.5 |
| Mother's Occupation | | |
| Unemployed/application | 15 | 7.2 |
| Student | 3 | 1.4 |
| Artisan/Farmer/Driver/Okada Rider | 4 | 1.9 |
| Trader | 106 | 51.2 |
| Civil Servant | 78 | 37.7 |
| Travelling | 1 | 0.5 |

Table 2 shows the obstetric history of the mothers. Results from the study indicates that the greatest proportion of the participants, 76.8% had carried 2-4 pregnancies, 79.2% have had 2-4 children, while 98.1% had 1-4 children surviving.

Table 2: Obstetric History

| Mother' Gravidaity | Frequency | Percent |
|----------------------------------|------------------|----------------|
| 1 Pregnancy | 30 | 14.5 |
| 2-4 Pregnancy | 159 | 76.8 |
| 5-7 Pregnancy | 18 | 8.7 |
| Mother's Parity Group | | |
| 1 Child | 34 | 16.4 |
| 2-4 Children | 164 | 79.2 |
| 5-7 Children | 9 | 4.3 |
| Number of Surviving Group | | |
| 1-4 Children | 203 | 98.1 |

5-6 children 4 1.9

Table 3 shows the history of the neonates. Results from the study indicate that half of the children admitted were out born, and 81.6% had neonatal sepsis on admission.

Table 3: Neonate History

| Nature of admission | Frequency | Percent |
|-------------------------------------|-----------|---------|
| Inborn | 102 | 49.3 |
| Out born | 105 | 50.7 |
| Baby's Diagnosis on admission | | |
| Nil | 29 | 14 |
| Neonatal Sepsis | 169 | 81.6 |
| Severe Neonatal | | |
| Sepsis+Jaundice | 6 | 2.9 |
| Prematurity | 3 | 1.4 |
| Gestational Age at Birth | | |
| 26-34 Severely Pre-mature | 117 | 56.5 |
| 38-43 Normal | 90 | 43.5 |
| Birth Weight/Admission Weight Group | | |
| 2 kg | 25 | 12.1 |
| 3 kg | 171 | 82.6 |
| 4 kg | 11 | 5.3 |

Table 4 shows that baby care management. The results from the study show that 81.2% initiated breastfeeding, while 16.4% were fed by tube. Also, 39.6% started IV fluid intake, while 25.6% were placed on oxygen. In addition, 15.5% were resuscitated while 2.9% were intubated, and 90.8% received antibiotics therapy. However, 95.2% were not able to practice kangaroo mother care, while 10.1% of the babies died.

Table 4: Baby Care Management

| Breast feeding | Frequency | Percent |
|---|-----------|---------|
| Not certain | 1 | 0.5 |
| No | 38 | 18.4 |
| Yes | 168 | 81.2 |
| Breast feeding, Date Commenced & Discontinued | | |
| Not specify | 89 | 43 |
| Breastfed | 118 | 57 |
| Tube feeding | | |
| Not specify | 174 | 84.1 |
| Tube fed | 33 | 15.9 |
| I.V Fluid administration | | |
| Not specify | 131 | 63.3 |
| Received | 76 | 36.7 |
| Oxygen administration | | |
| Not specify | 160 | 77.3 |
| Received Oxygen | 47 | 22.7 |
| Resuscitation | | |
| Not specified | 180 | 87 |
| Resuscitated | 27 | 13 |
| Assisted Breathing (Ventilator) | | |
| Not specify | 202 | 97.6 |

| | | |
|---|-----|------|
| Assisted with Ventilator | 5 | 2.4 |
| Phototherapy | | |
| Not received | 198 | 95.7 |
| Received | 9 | 4.3 |
| Kangaroo mother care | | |
| Not specify | 205 | 99 |
| Received | 2 | 1 |
| I.V Antibiotics administration | | |
| Not received | 19 | 9.2 |
| Received | 188 | 90.8 |
| I.V Antibiotics administration, Date Commenced & Discontinued | | |
| Not specify | 30 | 14.5 |
| D.O.A | 177 | 85.5 |
| Thermoregulation (nursed inside Incubator) | | |
| Not specify | 178 | 86 |
| Received | 29 | 14 |
| Care Outcomes | | |
| Nil | 7 | 3.4 |
| Survive and discharged home alive | 178 | 86 |
| Discharge against medical advice | 1 | 0.5 |
| Died | 21 | 10.1 |

Table 5 shows complication on discharge. Results from the study show that 1% had jaundice, while neonatal sepsis was resolved for the greatest proportion of the babies on discharge. However, 5.3% died of septicemia.

Table 5: Complication on discharge

| Complication on discharge if any | Frequency | Percent |
|-----------------------------------|-----------|---------|
| Nil | 204 | 98.6 |
| Jaundice | 2 | 1 |
| Kernicterus | 1 | 0.5 |
| Final diagnosis on discharge: | | |
| Nil | 52 | 25.1 |
| Septicemia | 12 | 5.8 |
| Neonatal Sepsis Resolved | 124 | 59.9 |
| Severe Neonatal Sepsis | 5 | 2.4 |
| K+S | 2 | 1 |
| Pre-term + Neonatal Sepsis | 5 | 2.4 |
| Prematurity + Sepsis | 4 | 1.9 |
| Overwhelming Sepsis | 1 | 0.5 |
| Neonatal sepsis + Severe Jaundice | 1 | 0.5 |
| Neonatal sepsis + Prematurity | 1 | 0.5 |
| Cause of death | | |
| Nil | 183 | 88.4 |
| Septicemia | 11 | 5.3 |
| Sepsis | 2 | 1 |
| Severe Neonatal Sepsis | 8 | 3.9 |
| K/Severe Jaundice/Sepsis | 3 | 1.4 |

Table 6 shows delivery details. Results from the study indicates that the greater proportion of the neonates, 51.2% were out-born, while 17.9% were admitted from private hospitals and home respectively. More so, 23.2% of the women delivered via elective caesarean section.

Table 6: Delivery Details

| Place of Delivery | Frequency | Percent |
|-----------------------------|-----------|---------|
| No response | 4 | 1.9 |
| Inborn | 97 | 46.9 |
| Out born | 106 | 51.2 |
| Source of Admission | | |
| No response | 4 | 1.9 |
| Labour ward | 22 | 10.6 |
| Postnatal ward | 36 | 17.4 |
| Private Hospital | 37 | 17.9 |
| Mission Hospital | 9 | 4.3 |
| Primary Health Care | 25 | 12.1 |
| State Hospitals | 17 | 8.2 |
| Mission Homes | 20 | 9.7 |
| Home | 37 | 17.9 |
| Mode of Delivery | | |
| No response | 43 | 20.8 |
| Spontaneous Vertex Delivery | 83 | 40.1 |
| Breech Extraction | 32 | 15.5 |
| Elective Caesarean Section | 48 | 23.2 |
| Emergency | | |
| Vacuum Extraction | 1 | 0.5 |

Table 7 shows pregnancy complications. The results from the study show that 18.4% of the participants had hypertension, while 12.1% had pre-eclampsia.

Table 7: Pregnancy Complication

| Pregnancy Complication | Frequency | Percent |
|-------------------------|-----------|---------|
| None | 97 | 46.9 |
| Pre-eclampsia | 25 | 12.1 |
| Eclampsia | 5 | 2.4 |
| Hypertension | 38 | 18.4 |
| Diabetes mellitus | 15 | 7.2 |
| Ante Partum Hemorrhage | 13 | 6.3 |
| PROM | 6 | 2.9 |
| CPD | 1 | 0.5 |
| Hyperemesis gravidarum | 3 | 1.4 |
| Premature concentration | 2 | 1 |
| Multiple Pregnancy | 2 | 1 |
| Total | 207 | 100 |

Table 8 shows delivery complications. Results from the study show that 15.5% of the respondents had premature rupture of membranes, while 13.5% had prolonged labour.

Table 8: Delivery Complication

| Delivery Complication | Frequency | Percent |
|-------------------------------|-----------|---------|
| None | 74 | 35.7 |
| Prolonged Rupture of Membrane | 21 | 10.1 |

| | | |
|-------------------------------|-----|------|
| Premature Rupture of membrane | 32 | 15.5 |
| Prolonged Labour | 28 | 13.5 |
| Obstructed Labour | 12 | 5.8 |
| Maternal Distress | 19 | 9.2 |
| Malpresentation | 11 | 5.3 |
| Premature Labour | 9 | 4.3 |
| CPD | 1 | 0.5 |
| Total | 207 | 100 |

Table 9 shows Apgar score at 1 minute and at 5 minutes. Results from the study indicates that 85% had mild birth asphyxia in 1 minute, while 86.5% had normal Apgar scores in 5 minutes.

Table 9: Apgar Score

| Apgar Score at 1minute Group | frequency | Percent |
|------------------------------|-----------|---------|
| 0-3 (Severe birth asphyxia) | 7 | 3.4 |
| 4-7 (Mild birth asphyxia) | 176 | 85 |
| 8-10 (Normal) | 24 | 11.6 |
| Apgar Score at 5minute Group | | |
| 0-3 (Severe birth asphyxia) | 6 | 2.9 |
| 4-7 (Mild birth asphyxia) | 22 | 10.6 |
| 8-10 (Normal) | 179 | 86.5 |

Discussion

Neonatal morbidity and mortality are major public health challenges around the world, with a huge percentage of deaths in the neonatal period, many of which are attributable to sepsis. In spite of great advances in antimicrobial therapy, neonatal life support measures and early detection of risk factors, neonatal septicaemia remains an important cause of morbidity and mortality in neonates (Sankar, Agarwal, Deorari & Paul, 2008; Chako & Sohi, 2005). Neonatal sepsis in itself is potentially treatable and preventable however despite considerable advances and improvements in the survival rates of the newborn in developed countries, there has not been a concomitant improvement in outcomes recorded in developing countries. Results from this study indicates an 81.6% prevalence of neonatal sepsis, similar to that found in the study of Mustefa, Abera & Aseffa, et al, (2019), where 78.3% had neonatal sepsis. This finding is however in contrast with findings from the study of West & Tabansi (2014) which reported a 33.1% prevalence, and the 34.4% prevalence reported in Jos, Nigeria, respectively (Bode-Thomas, Ikeh & Ejiologu (2004). This difference could be due to the time period over which data for the different studies were collected. However, with a perceived increasing prevalence of neonatal sepsis in Nigeria, there is a great need to prevent the risk factors that could aggravate neonatal sepsis by improving conditions surrounding delivery.

Also, 53.2% of the neonates are males. This indicates a higher number of male neonates developing sepsis. This finding agrees with findings from the study of Fekadu, Abera & Tekle (2019); and Dhupal, Ujagare, Gandham, Nagdawane & Sardar, et al, (2012), where a higher proportion of the neonates in the study were males. Male neonates have also generally been identified to be more susceptible to neonatal sepsis globally. In addition, 74.9% of the participants were in the early neonatal period and hence, this could have increased their susceptibility for neonatal sepsis. There is, therefore, a need to ensure adequate infection protection measures especially for neonates within the first seven days of life.

Results from the study also indicate that half of the children admitted were out born. This, as also observed in another study by Iroha, Egri-Okwaji, Kesah & Odugbemi (1998), may have contributed to the increased prevalence of neonatal sepsis, seeing most deliveries outside the hospital are usually supervised by traditional birth attendants whose unhygienic methods contribute to infections. Delivery outside the hospital is a major risk factor for neonatal sepsis. Babies delivered outside the hospital are more likely to

develop sepsis when compared with neonates born at the hospital. A possible reason for this could be prolonged labour before visiting health facilities. This has the possibilities of complicating the conditions.

Neonatal sepsis is caused by a host of factors, including those related to the mother and the neonate. Results from the study show that a variable proportion of the mothers in this study had hypertension and pre-eclampsia, while some of them also had premature rupture of membranes and prolonged labour. PROM \geq 18 has been known to be positively associated with neonatal sepsis (Mustefa, et al, 2019). Findings from this study is, therefore, similar to findings from the study of Perez, Lona & Quiles et al (2015); Reishobowale (2018), and Woldu, Guta & Lenjisa, et al, (2014), where the mothers were found to have had PROM and prolonged labour. Likewise, neonates born from mothers who give birth by a labour lasting \geq 12 hours were more likely to develop neonatal sepsis compared to neonates born from mothers who give birth by a labour lasting <12 hours. This can be explained by the fact that in mothers with a labour prolonging longer than 18 hours after rupture of membrane, the neonates are at increased chance of suffering from infection from the genital tract. In addition, a prolonged labour will predispose the new born to suffocation and aspiration of amniotic as well as other fluids in the way, which in turn, increases the risk for neonatal sepsis. Results from the study also indicates that a large proportion of the participants, 85% had mild birth asphyxia in 1 minute, while 86.5% had normal Apgar scores in 5 minutes. An APGAR score \leq 6 have been positively associated with neonatal sepsis compared to an APGAR score \geq 7 (Gebremedhin, Berhe & Gebrekirstos, et al, 2015; Moges, Eshetie & Yeshitela, 2017). This could have also increased the prevalence of neonatal sepsis in this study.

Furthermore, empirical treatment has been known as the mainstay management of neonatal sepsis in most developing countries. The antimicrobial use pattern in most hospitals is mainly empirical. This may increase the development of resistant microbial, which in turn affects future drug selection in the management of neonatal sepsis. Results from the study show that almost all the neonates, 90.8% received antibiotics therapy. This finding is similar to findings from the study of Woldu et al, (2014), where 72.2% of the neonates diagnosed as sepsis were receiving antibiotics. Inadequate and haphazard antibiotic use has been observed as part of the factors complicating neonatal sepsis management. This may also be a contributory factor to the increased prevalence of neonatal sepsis in this study.

The outcome of neonates with infections is strongly related to their appropriate diagnosis and management. Diagnosing neonatal infection, however, is a challenge, since 10.1% of the neonates died, which is noted as a high death rate. This finding is in tandem with the findings from Fekadu, Abera & Tekle (2019) and Tumaini, Fredrick, Matee & Massawe (2012), where neonatal mortality was found to be high. It is, however, in conflict with findings from the study of Ogunlesi & Ogunfowora (2010), where neonatal mortality was found to be low. The higher cases of neonatal mortality in this study case could also be attributed to the low health care utilization of women while there may be the difference in socio-cultural factors of the area. Additional factors related to neonatal deaths in the present study were associated with small neonate's birth size, birthplace, mother education, maternal illness, parity and delivery without health professional's assistance.

On outcome of management, results from the study show that 1% had jaundice, while neonatal sepsis was resolved for the greatest proportion of the babies on discharge. However, 5.3% died of septicemia. The outcome of neonates with infections is strongly related to their appropriate diagnosis and management. Diagnosing neonatal infection, however, is a challenge, since clinical signs and symptoms are often nonspecific for a particular infection. As a consequence, deciding whether to treat or not, balancing optimal patients care with aspects such as possible adverse events or antibiotic resistance, may be difficult. Rapid, accurate detection of infected infants remains the most effective means of curbing sepsis-related mortality (Jumah & Hassan, 2007).

Finally, on prevention of neonatal sepsis, it is documented that the prevention of neonatal sepsis should start from antenatal clinic which is right from the pregnancy period. To reduce the incidence and mortality due to sepsis, prevention of low birth weight (LBW), good maternity services, early recognition of high-risk cases and prompt referral are needed.

Conclusion

Nurses and midwives take care of individuals at every stage of their life. Their interaction with patients starts at diagnosis of the condition up till institution of various interventions for the patient. It is, therefore, important that nurses have good knowledge of management of neonates admitted in the neonatal intensive care unit, in order to help reduce the increasing prevalence of neonatal sepsis in the unit. There is also a need for nurses and midwives to leverage on the antenatal period to equip women with adequate information about neonatal sepsis, in order to help them prevent sepsis in the antenatal, intra-natal and post-natal periods. Nurses and midwives should also ensure appropriate interventions are taken especially in the neonatal intensive care units in order to prevent transmission of infection via instrument especially for bottle-fed neonates. Nurses and midwives should also serve as advocates for neonates especially in forming great alliances with the mothers and other health care workers in order to prevent conditions that can lead to infection.

Recommendations

1. Different risk factors are known to predispose neonates to sepsis, including maternal illness and condition before, during and after delivery, inappropriate handling of instrument, bottle or tube feeding, as well as delivery outside standard health care facilities.
2. Great need to reduce morbidity and mortality associated with neonatal sepsis to the barest minimum by ensuring that women are educated on proper infection control and treatment of maternal illnesses.
3. Conditions surrounding labour such as frequent vaginal examinations, which could lead to neonatal sepsis should also be reduced to the barest minimum in order to reduce the risks of developing neonatal sepsis.

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