

## Early Neonatal Infections: Epidemiological, Diagnostic and Evolving Aspects in the Kara Community (North Togo)

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### Abstract

**Introduction:** Neonatal infection (NNI) is one of the top three causes of morbi-mortality in newborns. The objective of this study was to describe the epidemiological, diagnostic and evolutionary aspects of early neonatal infection in Kara commune.

**Patients and Methods:** This was a cross-sectional study in neonatology units from January 1st to March 31st 2016. Included were newborns with a risk factor and/or a sign of danger within the first 7 days of life. The main parameters studied were infectious risk factors, clinical and evolutionary data.

**Results:** Out of 317 infants hospitalized, 176 (59.3%) 1.9 - 1.3 days, of which 104 boys (sex ratio 1.4) were included. The main infectious risk factors were amniotic fluid abnormalities (43.2%), fetal suffering (27.8%), unexplained prematurity (26.1%), and maternal fever during labour (10.8%). Clinical signs were dominated by respiratory distress (69.9%), thermoregulation disorders (57.4%); perinatal asphyxia (38.6%), and low birth weight (31.8%). The case fatality rate was 20.5% after a hospitalization of 4.3 - 2.6 days.

**Conclusion:** Early neonatal infection remains an undeniable cause of early neonatal mortality, hence the interest of early and adequate care of any newborn at birth in the commune of Kara.

**Keywords:** Newborn; Risk Factors; Neonatal Infection; Togo

### Introduction

According to the World Health Organization (WHO), neonatal infection (NNI) is one of the three leading causes of neonatal death, in addition to asphyxiation and prematurity. The perinatal mortality rate in 21 countries in the 04 Sub-Saharan African Regions is 34.7 per 1000 births [1]. In Togo, the rate rose from 40 degrees in 1998 to 27 live births in 2014. Two-thirds of neonatal deaths could be prevented through high coverage and better neonatal care [3-5]. In the foreground in the care of pregnant women and parturients far from African capitals, paramedics and midwives are unable to identify the immediate needs of care for newborns, often explaining the third delay in care [4-6]. The municipality of Kara, located 400 km from the capital Lomé, is no exception in terms of limited human resources and technical plateau. We therefore found it appropriate to carry out this work, the aim of which was to describe the epidemiological, diagnostic and evolutionary aspects of early neonatal infection in order to improve its management in the reference hospitals of the commune of Kara.

## Patients and Methods

This was a cross-sectional study, conducted from 1<sup>st</sup> January to 31<sup>st</sup> March 2016 (3 months) in the paediatric wards of the Kara University Hospital Centre (CHU-K), the Kara Regional Centre (CHR-K), and the Mother-Child Hospital of the Kara Children's Social Works Department (HME-SOS-VE K). These three services constitute the reference centres of the municipality of Kara in terms of the health of the child and the newborn. The sampling was non-probabilistic and accidental and included all infants 0 to 7 days of age who had a neonatal infection on the basis of infectious risk and the presence of clinical signs of InNI, hospitalized and examined in the pediatric ward. This diagnosis was essentially clinical for public health reasons and especially of limited technical plateau.

WHO advocates for public health purposes, to optimize the diagnosis of NNI and to reduce deaths in developing countries, to consider a newborn with NIS if it shows unusual signs (signs of danger) associated with a factor of risk [7].

Infectious risk factors include unexplained maternal fever prior to delivery, urinary tract infections and purulent leukorrhoea, amniocopy or strapping, premature and prolonged rupture of the water pocket (more than 12 hours), tinted and/or fetid amniotic fluid, unexplained fetal suffering, repeated vaginal or septic obstetric manoeuvres, prolonged labour (longer than 12 hours) or rapid work known as lightning (less than 6 hours), home birth, spontaneous prematurity, and abnormal appearance of the placenta [7].

Signs of danger include rapid breathing (more than 60 movements per minute) or too slow breathing (less than 30 movements per minute), severe intercostal and sub-costal circulation, and/or exhalation, high temperature (above 37.5°C) or lowered temperature (lower 36.5°C), poor breast intake, red or purulent umbilical, lethargy or altered consciousness, the presence of more than 10 skin pustules, paleness or cyanosis, jaundice in the 48 first hours of life or after the tenth day of birth, abdominal bloating, convulsions, spraying of the fontanelle, and the flow of pus to the ear [7].

Biological elements such as an increase in C-reactive protein, hyperleukocytosis or hemogram leukopenia will support the diagnosis which, if possible, must be confirmed by identifying the germ in question (liquid study cerebrospinal or gastric fluid, cytobacteriological examination of urine...).

We excluded newborns who died upon admission, and those referred to paediatrics for suspected neonatal infection but had no clinical or biological signs of infection.

Administrative authorization from hospitals and oral informed consent from the mothers of the included newborns were obtained prior to the collection of the data.

The data collection technique used was that of question-and-answer and physical examination of the newborn from a fact sheet.

The main parameters studied were risk factors related to pregnancy, childbirth and the newborn, clinical and paraclinical signs, and evolution. The data was analyzed using Epi Info 3.5.1. The Khi-two test was used with a p-meaningful threshold of 0.05.

## Results

### Sociodemographic characteristics

Among 1,063 children hospitalized, there were 317 newborns (29.8%) 176 (55.5%). Of these infants included, 98 were hospitalized at CHU-Kara, 44 at CHR-Kara and 34 at the MCH-SOS-VE.

Mothers were between 18 and 35 years old in 159 cases (90.3%), less than 18 years in 6 cases (3.4%) and over 35 years in 11 cases (6.3%). They lived in semi-urban areas in 95 cases (54.0%) 81 (46%). Nine mothers (5.1%) were employed and 67 (38.1%) specials.

The sires were employees in 46 cases (26.1%) and individuals in 71 cases (40.3%). Mothers and their spouses were unemployed in 100 (56.8%) respectively and 59 (33.5%) Case.

Newborns were aged an average of 1.9 days at admission. There were 104 newborns (59.1%) male and 72 (40.9%) sex ratio (H/F) of 1.4.

**Infectious risk factors**

Predominant perinatal infectious risk factors were meconial and/or fetid amniotic fluid (43.2%), unexplained fetal suffering (27.8%), spontaneous prematurity (26.1%) and unexplained maternal fever during labour (10.8%). Other infectious risk factors were premature or prolonged rupture of membranes (6.3%), maternal genitourinary infections (3.4%), home delivery (2.3%). Of the 46 cases (26.1%) pregnancy was between 27 and 33 weeks of amenorrhoea (AS) in 31 cases (17.6%), and between 34 and 36 SA in 15 cases (8.5%). Pregnancy was poorly followed (less than 4 antenatal consultations) in 96 cases (54.5%). Malaria and genital candidiasis were found in 8 cases (4.5%) respectively.

**Clinical and paraclinical signs of neonatal infection**

The main clinical signs found were respiratory distress (69.9%), thermoregulation disorders (57.4%) and perinatal asphyxia (38.6%) (Table 1).

| Clinical signs             | Effective | Percentage |
|----------------------------|-----------|------------|
| Respiratory distress       | 123       | 69,9       |
| Thermoregulation disorders | 101       | 57,4       |
| Perinatal asphyxia         | 68        | 38,6       |
| Low birth weight           | 56        | 31,8       |
| Poor breast-taking         | 40        | 22,7       |
| Unexplained crying         | 18        | 10,2       |
| Refusal to drink           | 14        | 8,0        |
| Lethargy                   | 12        | 6,8        |
| Early Jaundice             | 11        | 6,3        |
| Bombing the fontanelle     | 8         | 4,5        |
| Coma                       | 7         | 4,0        |
| Umbilical redness          | 6         | 3,4        |
| Abdominal bloating         | 4         | 2,3        |
| Convulsion                 | 4         | 2,3        |
| Diarrhea                   | 4         | 2,3        |
| Localized skin infection   | 4         | 2,3        |
| Conjunctivitis             | 2         | 1,1        |
| More than 10 pustules      | 2         | 1,1        |

**Table 1:** Distribution of newborns by clinical signs of infection.

Biological abnormalities were leukopenia/hyper leukocytosis (13/112 cases), a high C-reactive protein (5/20 cases), and a thick drop with thin smear positive for plasmodium falciparum (7/150 cases).

**Evolutionary aspects**

The average length of hospitalization was 4.3 to 2.6 days with extremes of 1 and 15 days. Antibiotic therapy combined third-generation cephalosporin and aminoside Evolution was marked by healing in 120 cases (68.2%). One death was reported in 36 cases (20.5%), including 22 premature babies (61.1%) with a significant value of p equal to 0.0001. This evolution was unknown, i.e. indeterminate due to runaway (11 cases) or on-demand release (9 cases) (Table 2).

| Care center                    | Evolution of newborns |         |         |       | Value of p |
|--------------------------------|-----------------------|---------|---------|-------|------------|
|                                | Death                 | Healing | Unknown | Total |            |
| Kara University Hospital       | 25                    | 58      | 15      | 98    | 0,012      |
| Kara Regional Hospital         | 7                     | 33      | 4       | 44    |            |
| Mother-Child-SOS Kara Hospital | 4                     | 29      | 1       | 34    |            |
| Total                          | 36                    | 120     | 20      | 176   |            |

**Table 2:** Breakdown of newborns by evolution and care center.

Regarding age at the time of death, 25 newborns died on the first day of life (69.4%), 7 (19.4%) the second day of life, 1 (2.8%) day three and 3 (8.4%) the fourth day of life.

**Discussion**

**Socio-demographic aspects**

In our study, mothers and spouses were unemployed in 56.8% and 33.5% respectively. Socio-economic insecurity is an aggravating factor in morbidity and perinatal mortality [5,8]. Indeed, the first delay can be explained in our working conditions by the unfavorable socio-economic precariousness; mothers of newborns being employees in only 5.1% in our study and therefore are not in decision-making regarding the care of newborns.

The prevalence of early neonatal infections (55.5% in our work) combined with insufficient human and material resources justify the early detection of neonatal infections on the basis of public health arguments and also training courses initiated in Recent Times in Togo [9,10].

**Diagnostic aspects**

History and perinatal history are key elements in the early diagnosis of early neonatal infections [6].

Meconial and/or fetid amniotic fluid was the most preponderant infectious risk factor (43.2% of cases), followed by unexplained acute fetal suffering (27.8% of cases) in our series. Tinted or fetid amniotic fluid has been reported as the leading infectious risk factor (26.1%) followed in third position of unexplained maternal fever (22.4%) Abidjan [11]. These two factors are used in the diagnosis of chorioamnionitis often related to premature rupture of membranes: 6.3% in our series.

Clinically, the most obvious signs of neonatal infection in our study were respiratory distress (69.9%), thermoregulation disorders (57.4%), perinatal asphyxia (38.6%). Respiratory distress (41.2%), fever (37.2%), and brain suffering (32.8) were the first three signs of

infection found in Folquet, *et al's* work [11]. These signs are often at the forefront of early neonatal infections and attract faster attention from providers and sometimes even parents because they are the monitoring elements of any newborn just after delivery.

In our study, 31.8% of newborns had a low birth weight (less than 2500g). This low birth weight or prematurity trend has been proven by other authors [6,12-14].

Any unexplained intrauterine growth delay and/or spontaneous prematurity should routinely seek a maternal-fetal infection and therefore an early neonatal infection; this would improve the time it takes to diagnose and manage, resulting in early and adequate management and thus reducing the mortality of these newborns.

### Evolutionary aspects

The neonatal case fatality rate in our study was 20.5%. This rate is lower than the 38.7% and 33.3% respectively in 1998 and 2004 in Kara [15,16]. This steady decline in case fatality due to neonatal infections could be explained by the strengthening of the capacity of newborn staff in Togo, as elsewhere in Africa [17]. However, biases related to the period and type of study remain possible.

Our study revealed several lethal factors in early neonatal infection, some of which have a high degree of danger such as place of investigation, age at admission, and termination of pregnancy. Prematurity appears to be a predictor of neonatal mortality in our study, as in 2004 in Togo with 32.6% [16] or in 2014 in Côte d'Ivoire in 2014 with 28% [5].

Other factors such as delays in consultation and referral to a higher level of care, combined with a lack of financial resources and parents' refusal to go to the higher level of care, would explain the high mortality rate early neonatal [4-6].

### Conclusion

The main infectious risk factors found in this study are preventable. The essentially clinical presumptive diagnosis allows for probabilistic treatment. The fatality rate in hospitals is relatively high. A synergy of actions, from the pre-conceptual period to the post-natal period, would reduce the share of infections in neonatal mortality.

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