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Neonatal Jaundice: Epidemiological, Diagnosis, and Prognosis Aspects in the Pediatric Department of the Roi Baudouin Hospital Center in Guediawaye (Dakar, Senegal)

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Abstract

Introduction: Neonatal jaundice is defined as a yellowing of the skin and mucous membranes caused by the deposition of bilirubin in the tissues of a newborn. It is a very common symptom requiring significant medical attention in newborns, affecting 60% to 85% of them. The objective of our study was to describe the epidemiological, diagnosis, and prognosis aspects of neonatal jaundice at the Neonatology Center of the King Baudouin Hospital. **Materials and Methods:** This was a retrospective, descriptive, and analytical single-center study conducted from January 2019 to December 2022, at the King Baudouin Hospital Center in Guediawaye. All newborns admitted to the unit for neonatal jaundice or who developed jaundice during hospitalization were included. Incomplete or unusable records and transferred newborns were excluded. Data were collected from medical records. Analysis was performed using SPSS version 22. **Results:** Of the 285 newborns hospitalized, 116 were admitted for neonatal jaundice, representing a prevalence of 40.7%. The sex ratio was 2.66. Clinically, the most frequently observed signs were frank jaundice (88.8%), respiratory distress (28.4%), and signs of prematurity (14%). Plasma bilirubin levels were measured in 54.6% of newborns, and 28.5% presented with predominantly unconjugated hyperbilirubinemia (UCB). Infections and prematurity were the most common causes of UCB jaundice, accounting for 40.7% and 18.6% of cases, respectively. Biliary atresia was the only etiology of cholestatic jaundice in one newborn. Phototherapy, whether intensive or con-

ventional, was administered to 90.5% of newborns with non-cholestatic jaundice. The short-term outcome was favorable in 94.9% of cases. A mortality rate of 1.7% (2 patients) was observed in our study population. **Conclusion:** Neonatal jaundice is a common symptom that warrants special attention due to the serious complication it can cause: kernicterus. Therefore, it would be wise to develop a decision tree adapted to our context to ensure optimal management.

Keywords

Jaundice, Newborn, Bilirubin, Guediawaye, Senegal

1. Introduction

Neonatal jaundice is defined as a yellowing of the skin and mucous membranes caused by the deposition of bilirubin in the tissues of a newborn [1]. It is clinically noticeable as soon as the total bilirubin (TB) level reaches and exceeds 50 mg/L. It is a very common symptom requiring significant medical attention in newborns, affecting 60% to 85% of them [2] [3]. It is the most frequently reported cause of hospitalization in the neonatal period [4]. Unconjugated bilirubin (UCB) jaundice, unlike neonatal cholestasis, remains the most common [5]. However, it becomes dangerous if serum bilirubin levels are elevated, with a risk of kernicterus in 2.5% to 5% of cases. Unlike UCB jaundice, neonatal cholestasis does not present this neurotoxicity. However, some of these cholestases, and particularly atresia of the extrahepatic bile ducts, warrant urgent surgical treatment [6]. Neonatal jaundice is a broad clinical entity with diverse and varied etiologies and requires specialized management. In Senegal, a 2021 study [7] found a prevalence of 48.3%. The scarcity of data in the suburbs of Dakar regarding this frequent reason for consultation in its entirety motivated this study, whose general objective was to investigate the epidemiological, diagnostic, therapeutic, and prognosis aspects of neonatal jaundice. The specific objectives were to determine the hospital prevalence of neonatal jaundice, to describe the clinical and paraclinical characteristics of neonatal jaundice, to identify factors associated with neonatal jaundice mortality, and to provide recommendations to help improve the management of neonatal jaundice in Senegal.

2. Materials and Methods

This was a retrospective, descriptive, analytical and single-center study on neonatal jaundice at the King Baudouin Hospital Center in Guediawaye.

The study took place over a four-year period, from 1 January 2019 to 31 December 2022. The study population consisted of all newborns admitted to the neonatal unit during the study period. Included were all newborns admitted to the unit during the study period for neonatal jaundice or who developed jaundice

during hospitalization. Excluded were those with incomplete and unusable records, and newborns who had been transferred. Data were collected from medical records. The parameters studied were epidemiological, clinical, and paraclinical, as well as the treatments offered, etiologies, and outcomes. Frank jaundice has been defined as a yellow discolouration of the skin and/or whites of the eyes visible to the naked eye. The analysis was performed using SPSS version 22 and comprised two parts: a descriptive study and an analytical study. In the descriptive analysis, qualitative variables were described as counts and percentages, and quantitative variables as means with standard deviations, ranges, and medians. For the analytical study, we first conducted a bivariate analysis of the dependent variable, death, with epidemiological parameters, maternal data, pregnancy monitoring, and delivery and pregnancy parameters. The statistical tests used were the chi-square test for comparing percentages and Student's t-test or ANOVA for comparing means. The difference was considered statistically significant when the p-value was strictly less than 0.05. Next, we performed a multivariate analysis where all variables with a p-value less than 0.05 were retained to model the occurrence of death using logistic regression. Adjusted odds ratio (aOR) with their 95% confidence intervals were determined for each variable included in the final model.

3. Results

3.1. Descriptive Results

During our study period, 285 newborns were hospitalized, of which 116 presented with jaundice, representing a hospital incidence of 40.7%.

The median age of the children was 6 days [0 - 25 days]. The age group [1 - 7 days] was the most frequently observed (Figure 1).

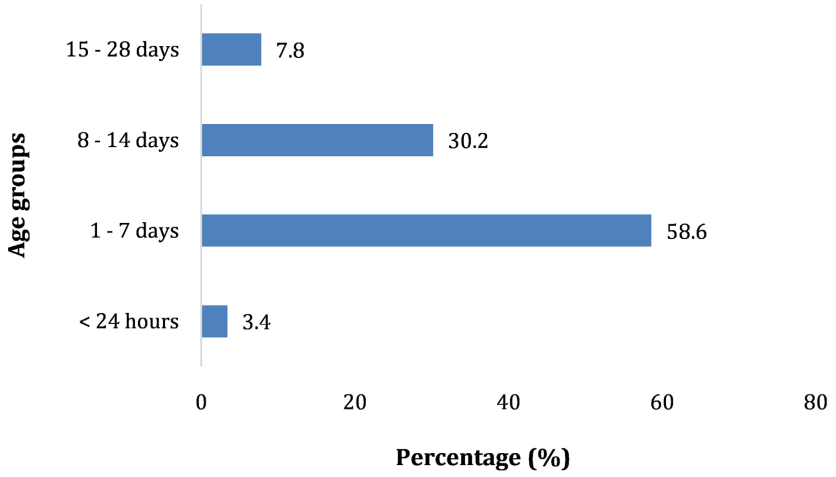

Figure 1. Distribution of children according to age groups.

There were more boys than girls, with a sex ratio of 2.26. Blood type was recorded for 88 mothers (75.9%). Blood type O was found in more than half of the mothers (60.2%). and a positive Rh factor in 94.3% of mothers. The Emmel test

was positive in 7 mothers (1.4%). All HIV rapid diagnostic tests (RDTs) were negative. The mean gravidity and parity were 2 [1 - 9 gravids] and [1 - 9 pares]. The mean gestational age was 37 weeks [28 - 43 weeks]. Prematurity and post-maturity were found in 20.7% and 9.5% of cases, respectively. Most women delivered vaginally (83.7%).

Clinically: upon admission, 81% of newborns presented with jaundice **(**Figure 2**)**.

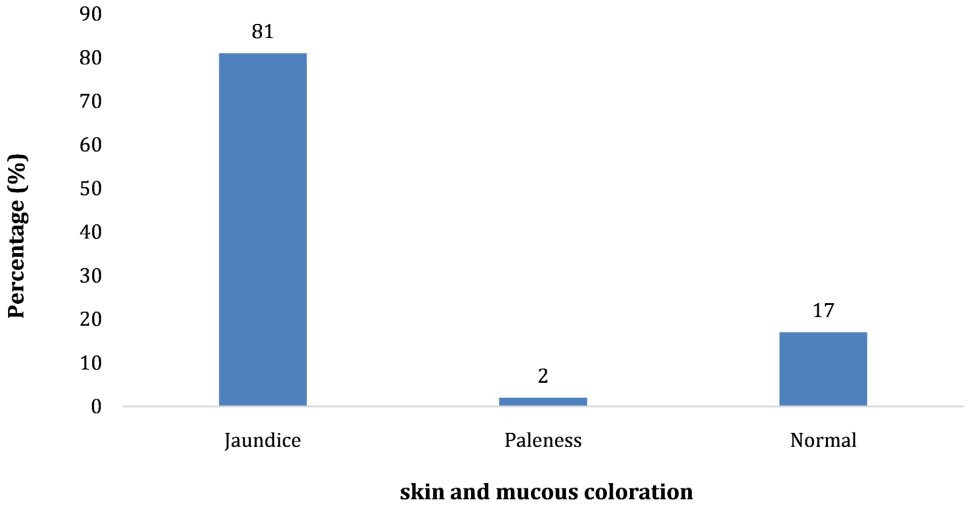

Figure 2. Distribution of newborns according to skin and mucous membrane coloration.

More than half of the newborns had a normal birth weight for their age upon admission (60%). It should be noted that 29 newborns (27.6%) had a low birth weight. More than half of the newborns were full-term (68.1%).

On the biological level: Plasma bilirubin levels were measured in 60 patients (54.6%) with an average level of 198.2 mg/l [5.6 - 520 mg/l]. Unconjugated bilirubin jaundice affected 28.5% of patients. The blood count was normal in 59.2% (n = 61). The abnormalities noted concerned hemoglobin levels with anemia found in 42.9% (n = 42), leukocytosis in 7.8% (n = 8) and thrombocytopenia in 2% (n = 2) **(**Table 1**)**.

Table 1. Distribution of newborns according to blood count abnormalities.

Blood count abnormalities	Number (n)	Percentage (%)
Anemia (Hemoglobin < 14 g/dl)	42	42.9
Hyperleukocytosis ≥ 14000/mm³	8	7.8
Leukopenia < 4000/mm³	3	3
Thrombocytosis > 500,000/mm³	11	10.7
Thrombocytopenia < 150,000/mm³	2	2

CRP was measured in 82 newborns. It was negative in 34 newborns (41.5%) and positive in the other 48 (58.5%). Twenty-three-point two percent (23.2%) (n = 27) of the newborns had diagnoses associated with neonatal jaundice. Neonatal bac-

terial infection was the main diagnosis associated with neonatal jaundice (40.7%) (n = 11) (Table 2).

Table 2. Distribution of patients according to associated diagnoses.

Related diagnostics	Number (n)	Percentage (%)
Neonatal bacterial infection (NBNI)	11	40.7
Prematurity	5	18.6
Asphyxia	3	11.1
Caput succedaneum	1	3.7
Biliary tract stenosis	1	3.7
Overdue	1	3.7
Conjunctivitis	1	3.7
Hemorrhagic disease of the newborn	1	3.7

One hundred and five newborns received phototherapy; the type of phototherapy was recorded for 25.9% of cases, and only 9.5% (n = 11) received intensive phototherapy. More than half of the newborns, 59.5% (n = 69), received antibiotic treatment. The most frequently used antibiotics were third-generation cephalosporins (3GCs) (97.1%) and aminoglycosides (87%). Other therapies included blood transfusion (12.9%) and vitamin K1 administration (53.4%). The outcome was favorable in 94.9% of cases, and 1.7% (2) were fatal. Prematurity was the leading cause of death. The average length of hospital stay was 5 days, ranging from 0 to 24 days.

3.2. Analytical Results

At the end of the study, the factors associated with death were the number of prenatal visits, parity, and gravidity. Mortality was 0.7 times higher in mothers who had fewer than 4 prenatal visits, 0.1 times higher in mothers with more than 4 deliveries, and in those with more than 4 deliveries. Table 3 shows the distribution of factors associated with death.

Table 3. Factors associated with death.

Factors associated with death	aOR	95% IC	P-value
Number of prenatal consultations			
<4	0.7		0.04
≥4			
Parity			
≥4	0.1	0.0018 - 2.05	0.03
<4			
Gesture			
≥4	0.1	0.0023 - 2.7	0.04
<4			

aOR = adjusted odds ratio; IC = interval confidence.

4. Discussion

4.1. Epidemiological Aspects

During our study, from January 2019 to December 2022, the prevalence of jaundice in newborns was 40.7%. Results from the literature showed a lower prevalence in Algeria in 2016 and in Morocco in 2017, at 31.4% and 21.3% respectively. In Senegal, according to the study conducted in 2021 at CHEAR, the prevalence was slightly higher than ours, at 48.3%. This can be explained by the fact that CHEAR is a national reference center [7].

The sex ratio was 2.26. The relationship between sex and neonatal hyperbilirubinemia was highlighted by Shailin *et al.*, who noted a certain male predominance in jaundiced newborns. Indeed, male sex is even considered a risk factor for severe jaundice [8]-[12].

4.2. Clinical Aspects

In our study, the symptomatology is dominated by frank jaundice in 88.8%, respiratory distress in 28.4% and signs of prematurity in 14%. General signs (fever/hypothermia) occurred in 5.1% of cases. These figures are slightly higher than those of the 2021 study [7] at CHEAR, which found jaundice in 73.5% of cases and respiratory distress in 28.3% of cases. Fever and signs of prematurity were found in 54.8% and 18.4% of cases, respectively, compared to 5.1% and 14% of cases in our study. This is explained by the fact that jaundice sometimes occurs in the context of a neonatal infection that can cause fever and respiratory distress in the newborn. In this case, the jaundice often has a hemolytic appearance, as we observed in our results.

4.3. Paraclinical Aspects

Blood testing of BT helps to assess the serenity on which the therapeutic decision is based. Fifty-four-point six percent (54.6%) of newborns had benefited from BT compared to 90.8% for the 2021 study in Senegal [7], 85.4% for the 2017 study in Morocco [13] and 77% for the 2016 study in Algeria [14]. Nearly half of the newborns in our study presented with anemia (42.9%). While jaundice was not the sole cause, leukocytosis was found in 7.8% of the newborns. Regarding anemia, our data were significantly higher than those found in Morocco in 2017 [13], representing 9.4% of cases, and comparable to data found at the CNHEAR in Dakar, with 34.3% and 40.4% respectively in 2017 and 2021. As for leukocytosis, our data are lower than the data from studies in Morocco in 2017 and at the CHNEAR in Dakar in 2017 and 2021, which represented 10.3%, 22.5%, and 27.4% respectively. Hyperleukocytosis is a sign that suggests an infectious etiology, while anemia suggests a hemolytic etiology. This shows that the latter is still common in our facility, unlike in the sub-region.

4.4. Etiological Aspects

Neonatal bacterial infection was among the top three causes of jaundice in new-

borns in our series. Indeed, the WHO estimated the global incidence of neonatal deaths at 2.8 million in 2015, and 47.6% were due to neonatal infection [15]. We found it in 40.1% of cases. It is often associated with another cause of jaundice or exacerbated a pre-existing factor. The majority of the studies consulted concur with these results [7] [11] [13] [16]. Maternal-fetal infections accounted for 11.2%. The results of this study are lower than those obtained by Niang *et al.* and Kulkarni *et al.* and Manning *et al.* with 11.7%, 21.6%, and 22% respectively [7] [9] [17]. This could be explained by the fact that diagnostic confirmation of NINB is rarely performed in our facility due to the sometimes low socioeconomic level and the high cost of tests. The diagnosis of biliary atresia was confirmed in a newborn. This condition is rare; the 2017 study in Morocco [13] found one case, and the 2021 study in Senegal found two cases [7]. Progress in diagnosis remains limited in our region.

4.5. Therapeutic Aspects

Phototherapy remains the primary treatment for neonatal jaundice due to non-communicable sclerosis (NCS). It was administered to 105 newborns (90.5%). Among our infants, 11 newborns received intensive phototherapy, representing 9.5%, a still low figure. This could be explained by the absence of a phototherapy tunnel in the pediatric department of the aforementioned center. Exchange transfusion (ET) was not performed on any newborns, compared to 1 and 6 in the 2021 [7] and 2017 [18] studies at CHNEAR. These declining results are explained by the fact that ET is tending to be abandoned in favor of intensive phototherapy.

4.6. Evolutionary Aspects

The outcome was favorable in the majority of cases in our study. A mortality rate of 1.7% was observed. According to Niang in 2021 [7], the mortality rate was 15.8% at CHNEAR. According to a 2017 study in Morocco, the mortality rate was 8.8%. These results could be explained by the fact that most newborns were born at King Baudouin Hospital and received very early care. Similarly, some severe cases were transferred to higher-level hospitals.

5. Conclusion

Neonatal jaundice is a common reason for consultation in our settings. Its causes are many and varied, and it must be treated early to avoid complications that can be life-threatening or functionally debilitating in some cases.

Conflicts of Interest

The authors declare no conflicts of interest.

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