Jaundice in the Newborn at the Teaching Hospital of Brazzaville

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Abstract

Introduction: Jaundice is a major symptom during neonatal time. It is defined by a bilirubin ≥ 50 mg/l. **Objectives:** To determine the frequency of neonatal jaundice at the Brazzaville University Hospital, to determine the main etiologies, to evaluate the management, to specify the evolution. **Patients and Method:** It was a prospective and descriptive study that was conducted in the Neonatology Department and Biochemistry Laboratory of the University Hospital of Brazzaville, from 1st August 2015 to 31st July 2016. It included newborn children admitted into the neonatal unit for treatment of jaundice. The variables studied were epidemiological, clinical, etiological therapy and outcome. **Results:** The frequency of the neonatal jaundice is 7.2%. The hyperbilirubinemia as not conjugated was found in 99.1% of cases. The main causes are bacterial neonatal infection n = 102 (47.9%), the physiological icterus n = 46 (21.6%) and the ABO incompatibility n = 40 (18.8%). The treatment consists of the phototherapy in all cases. Each phototherapy session lasts 3 hours n = 99 (56.9%), 6 hours n = 58 (33.3%) and 12 hours n = 17 (9.8%). The average duration of the administering of the therapy is of 3 ± 2 days. Hyperbilirubinemia encephalopathy occurred in 62 (29.1%) cases, including 49 cases of kernicterus. The death occurred in 70 (32.9%) children. **Conclusion:** The importance and the gravity of the neonatal jaundice require primary preventive means based on proper care in pregnancy and the birth. While the secondary prevention includes high index of suspicion, comprehensive diagnostic equipment availability to prevent acute bilirubin encephalopathy.

Keywords

Jaundice, Neonatal, Phototherapy, Bilirubin Encephalopathy

1. Introduction

Jaundice is a common symptom in the neonatal period [1]. Globally, it affects 84% of term newborns [1].

In the United States and France, jaundice is a common occurrence and affects respectively 65% - 85% and 50% - 70% of newborns whose gestational age is greater than or equal to thirty-five weeks of amenorrhea [2] [3]. In Africa, according to hospital statistics, jaundice accounts for 14.6% of hospitalization cases in Nigeria [4].

The relatively high frequency of jaundice during the neonatal period is related to the physiological peculiarities of the newborn which may be due to polycythemia, hyperhaemolysis and hepatic immaturity [5] [6] [7].

Complications, particularly neurological complications, are responsible for death and serious sequelae in the absence of adequate care.

In Congo, no study has been conducted to this major neonatal clinic condition. Also, this study is carried out with the aim of improving the management of jaundice in the neonatology department of the Brazzaville University Hospital. The specific objectives are to:
- determine the frequency of neonatal jaundice;
- determine the main etiologies;
- evaluate the management;
- specify the evolution.

2. Material and Methods

It was a prospective, descriptive and analytical study, carried out in the Neonatology Department and Biochemistry Laboratory of the University Hospital of Brazzaville, from 1st August 2015 to 31st July 2016 (12 months). It involved all neonates hospitalized for jaundice in the Neonatal department during the study period with total bilirubinemia ≥ 50 mg/l after parental consent for participation in the study.

Neonates with clinically jaundice, for whom no total bilirubinemia assay was performed, and those whose parents did not consent to participate in the study, were not included. On these criteria, 213 newborns were selected.

The determination of total and conjugated plasma bilirubinemia was performed by the Erba Mannheim XL Syspack®.

The variables studied were:
- in relation to the characteristics of the parents:
  - age;
  - the blood group;
- in relation to the obstetrical history of the mother:
  - the gestation;
  - parity;
  - the evidence of blood transfusion during pregnancy;
  - the search for irregular agglutinins;

- relating to the siblings:
- the existence of jaundice in the neonatal period;
- the existence of a G6PD deficiency
- in relation to childbirth and birth:
- the mode of delivery;
- the term;
- anthropometric parameters;
- concerning newborns:
- age;
- sex;
- the characteristics of jaundice;
- the biological aspects:
- total bilirubinemia;
- the values of hemogram;
- the diagnosis;
- therapeutic outline;
- evolution.

The data collected on the proform sheet were entered on the EPI Data version 3.1 software and analyzed on the EPI Info version 7 software. The quantitative variables were expressed as means ± standard deviation and the qualitative variables by their absolute frequency. For comparisons, we used the Chi-square test for qualitative variables and the Variance Analysis Test (ANOVA) for quantitative variables. The threshold of significance was set at $p < 0.05$.

3. Results

During the study period, 2958 newborns were hospitalized, of which 213 for jaundice or 7.2% of admissions.

The average age of parents was 33.5 ± 7.9 years (range: 18 and 58 years) for fathers and 26.3 ± 6.5 years (range: 14 and 42 years) for mothers.

The blood group was respectively for the father and the mother: O: n = 98 (46%) and n = 103 (48.4%); A: n = 71 (33.3%) and n = 65 (30.5%); B: n = 44 (20.7%) and n = 40 (18.8%); AB: only in mothers, n = 5 (2.3%). Discordant couples in the ABO group were 73 (34.3%).

Regarding the Rhesus group, it was respectively for the father and the mother, positive in 208 (97.7%) and 204 (95.8%) of the cases. There was a discrepancy in the Rh group of parents in 11 (5.2%) cases.

Mothers were primigravida in 86 (40.4%) cases, multi-gravida in 76 (35.7%) and large multi-gravida in 51 (23.9%) cases. They were primiparous in 126 (59.2%) cases, multiparous in 71 (33.3%) cases and grand-multiparous in 16 (7.5%) cases.

During pregnancy, no search for irregular agglutinin and no blood transfusions were performed.

A history of jaundice and anemia in the neonatal period in siblings was found in 4 (1.9%) cases and 1 (0.5%) cases, respectively. No case of G6PD deficiency

was noted in the siblings.

Delivery was vaginal in 185 (86.9%) cases and by caesarean section in 28 (13.1%).

By sex, newborns were: male: n = 121 (58.8%); female: n = 92 (43.2%).

The mean birth weight was 2456.8 ± 741.1 g (range 1000 to 4000 g). Newborns had low birth weight in 114 (53.5%) cases. The average size was 46.5 ± 4.5 cm (extremes: 28 and 55 cm). The average of head circumferences was 30.5 ± 2.8 cm (25 and 37 cm).

The mean age of the newborns at admission was 58.9 ± 102.1 hours (range: one hour and 26 days). Newborns were premature in 97 (45.5%) cases.

Jaundice was onset: early before the 72nd hour of life in 96 (45.1%) cases; intermediate, occurring between the 3rd and 7th day of life: 105 (49.3%); late after the 7th day: 12 (3.6%). Stools were normal staining for 206 (96.7%) and discolored in 7 (3.3%) cases. Jaundice with free bilirubin in 211 (99.1%) cases and bilirubin conjugates in 2 (0.9%) cases.

Mean total bilirubin was 184.6 ± 81.9 mg/l (range: 53.2 to 467 mg/l).

The diagnosis was: neonatal infection in 102 (47.9%) cases, physiological jaundice 46 (21.6%) cases, incompatibility ABO 40 (18.8%) cases, incompatibility Rhesus 4 (1.9%), mother's milk jaundice 4 (1.9%), other causes 8 (3.7%), cause not determined 9 (4.2%).

Phototherapy was used in 174 (81.7%) neonates. No newborn have benefited from exchange blood transfusion.

This was conventional discontinuous phototherapy in all cases. It was administered in 3-hour sessions in 99 (56.9%) newborns, 6-hour sessions for 58 (33.3%) and 12 hours for 17 (9.8%). The average total duration of phototherapy was 3 ± 2 days (range: 1 to 9 days).

The average decrease in bilirubin was 1.1% after 24 hours in neonates treated with phototherapy. The decrease in bilirubin levels after 24 hours averages 6% in 3-hour sessions, 12.3% in 6-hour sessions and 16% in 12-hour sessions. The kinetics of the evolution of bilirubinemia in neonates treated with phototherapy is mentioned in Figure 1 and Figure 2.

Adverse effects of phototherapy were noted in 37/174 (21.3%) neonates. These were: dehydration: 30 (81.1%) cases; hyperthermia: 5 cases; intestinal obstruction: 2 cases.

Acute bilirubin encephalopathy occurred in 62 (29.1%) cases, including 49 cases of kernicterus.

The death occurred in 70 (32.9%) children.

4. Discussion

The frequency of neonatal jaundice estimated at 7.2% in this study is significant, compared to the results of the Kabamba Mutombo study [8] in the Democratic Republic of Congo which noted a hospital frequency of 4.2%. Rabesandratana [9] in Madagascar, in a study on the epidemiological and clinical aspects of medical emergencies in neonatology in Mahajanga reports a frequency of 3.7%.
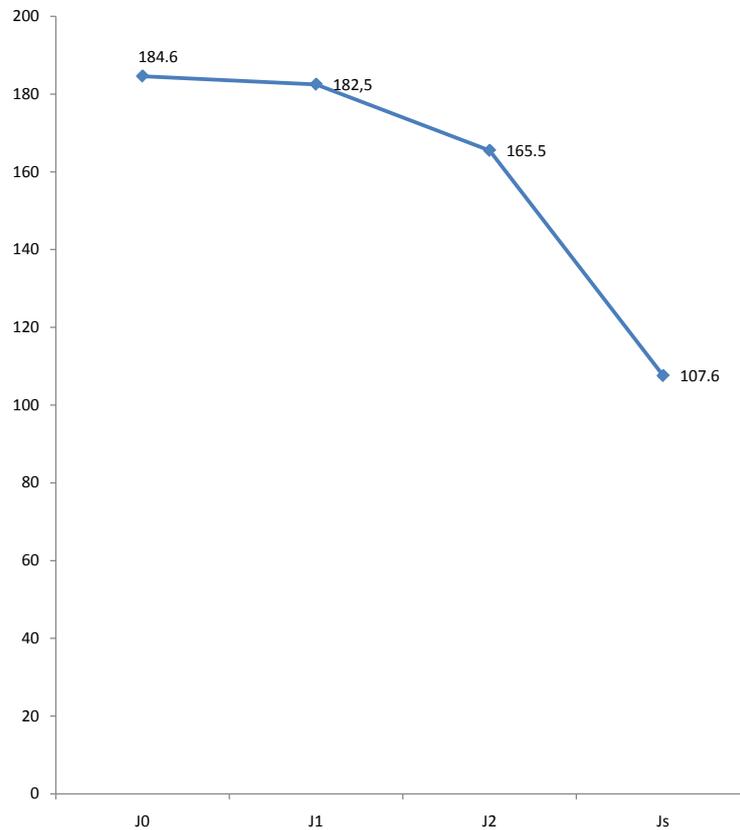
Figure 1. Change in bilirubin means (mg/l) before phototherapy, 24 to 48 hours after phototherapy and at discharge.
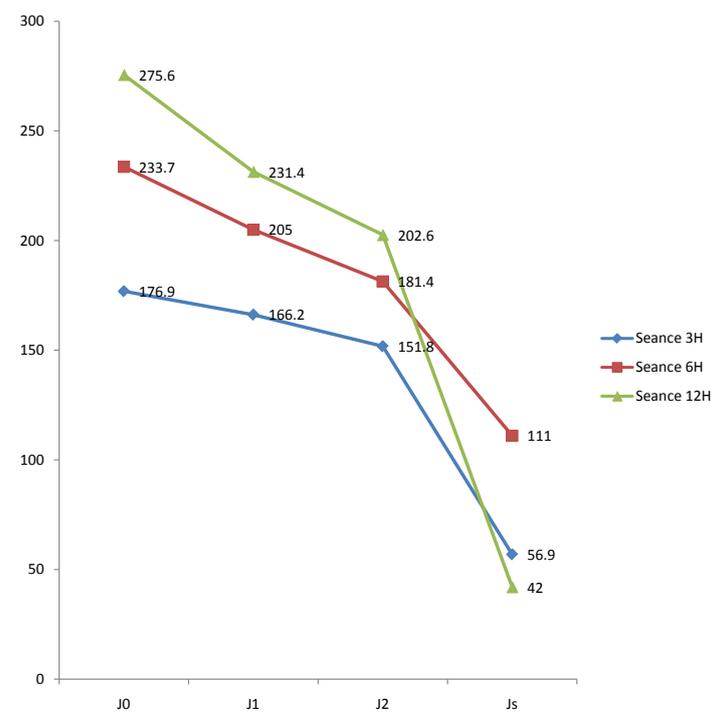
Figure 2. Changes in the mean total bilirubin level before phototherapy, 24 to 48 hours after the phototherapy, and on discharge depending on the duration of the sessions.

The frequencies reported in our work as well as those of Kabamba Mutombo [8] and Rabesandratana [9] are low compared to data from the Nigerian authors [4] [10], who report respectively 14.6% and 32%.

Methodological differences may explain these disparities. Indeed, the types of studies, the samples, the periods and the inclusion criteria are the same in these studies.

In our study, the population of neonates with unconjugated hyperbilirubinemia was 99.1%. The prevalence of unconjugated hyperbilirubinemia in the neonatal period is known because reported by all the authors consulted [2] [8] [9] [10] [11] [12], although in different proportions.

Neonatal bacterial infection (48.3%), physiological jaundice (21.8%) and incompatibility mother-infant in the ABO system (19%) are the main causes of jaundice of the newborn. For Kabamba Mutombo [8], the first two causes are neonatal infection and incompatibility in the ABO system.

In this study, as in the work of Chime [10] in Nigeria, Kabamba Mutombo [8] in the DRC, and Koosha [13] in Iran, the frequency of neonatal jaundice due rhesus iso-immunization were noted in 3.7%, 1.7% and 2.1% respectively.

Other causes of jaundice such as G6PD deficiency and pyruvate kinase deficiency, reported by Sgro [12], Chime [10], Koosha [13] and Christensen [11], were not identified due to lack of appropriate equipment in our health facility.

In 4.3% of newborns, no etiology was found. This is a known fact because it is also reported in the works of African authors but also in those of developed countries [10] [11] [12] [13].

Phototherapy is the main therapeutic remedy [6] [7] [14]. We used it in 81.7% of newborns. In all cases conventional phototherapy was used.

Gordon [15] in Kenya and Brouk [16] in Algeria also used first-line phototherapy. Intensive phototherapy, the effectiveness of which is proven in severe hyperbilirubinemias, not available in Brazzaville, was the most used therapeutic method by Brouk [16].

The evolution of neonatal jaundice is closely related to gestational age, cause of jaundice and function of management. The evolution was favorable in 67.1% of newborns, death was recorded in 32.9% of newborns. Kabamba Mutombo *et al.* [8] reported 82.3% of favorable evolution.

Among the criteria for resolving jaundice is normalization of the total bilirubin level.

We observed a reduction of bilirubinemia after 24 hours of 10.4%. Kale [17] in Turkey reported 32.6%, a reduction in the average level of total bilirubin after 24 hours. The lack of continuous phototherapy explains poor results of our work.

In Brazzaville, hyperbilirubinemic encephalopathy: 29.1% of cases and nuclear jaundice 23% of cases with lethality of 57.1% are the major complications of jaundice of the newborn.

In countries with modern equipment, such as Great Britain, Denmark, Canada, the incidence of kernicterus is 1 per 100,000 and 1/43,000 [18] [19] [20].

Cortey in France [21] reports an upsurge in nuclear jaundice.

5. Conclusions

This work was carried out on 213 newborns allowing us to determine the frequency of jaundice at the University Hospital of Brazzaville, to identify the main etiologies and to outline the therapeutic modalities as well as the evolutionary aspects.

Neonatal jaundice is a reality at the University Hospital of Brazzaville; bacterial infection and fœto-maternal incompatibility in the ABO system are the main causes.

The course of jaundice is severe because of the high incidence of hyperbilirubinemia encephalopathy and progression to nuclear jaundice.

The lack of early detection of jaundice in maternity hospitals, poor antenatal care and robust neonatal and maternity services, characterized by an insufficient number of conventional phototherapy devices and the lack of intensive phototherapy and fiber optics explain the high observed mortality in this work.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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