

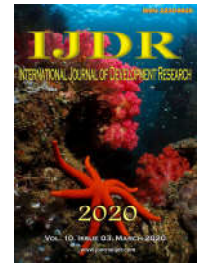


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CLINICAL PROFILE OF NEWBORNS SUBMITTED TO PHOTOTHERAPY IN A NEONATAL UNIT

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ABSTRACT

Objective: To describe the clinical profile of newborns submitted to phototherapy in a neonatal reference unit. **Materials and Methods:** This is a longitudinal descriptive research with quantitative approach. The sample consisted of 90 newborns admitted to a neonatal unit and their respective mothers, highlighting clinical variables through information contained in the medical records. The research was approved by the Research Ethics Committee of the Santa Casa de Misericórdia do Pará Foundation Hospital (ruling no. 640.197 and Certificate of Presentation for Ethical Consideration no. 28208214.0.0000.5171 from May 2014). **Results:** It was found that the newborns had the following characteristics: prematurity (75.8%), small for gestational age (73.3%), born via Caesarean Section (67.7%), rehospitalization for jaundice (66.7%), average of 3 days to begin Enteral Nutrition, treatment time of 6 days, beginning of phototherapy around the 3rd and 5th day of life. It was predominant in the study: primigravidae (50%), aged 19 to 30 years old (61.2%), with emphasis on the O+ group (45.5%), who attended less than 6 prenatal consultations (57%). **Conclusion:** Most variables are consistent with publications on the subject, however others stood out with evidence in the sample studied, pointing out peculiarities among the newborns submitted to this research.

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INTRODUCTION

Newborns are beings in transition and, for this reason, are subjected to numerous changes that contribute to their health imbalance such as regurgitation, colic, hypoglycemia, hyperbilirubinemia, among others (THIELEMANS *et al.*, 2017). The conditions that affect these neonatos have been the main focus of many researches, and among them, jaundice, is considered as an important change in the neonatal period and corresponds to the clinical expression of hyperbilirubinemia, that is, the accumulation of bilirubin in the blood (BRASIL, 2014). Jaundice is one of the most common physical examination findings in healthy or sick newborns.

About 98% of newborns have indirect serum bilirubin levels above 1mg/dL during the first week of life, which generally reflects neonatal adaptation to bilirubin metabolism (BRASIL, 2014). When there is a significant increase in this level, the onset of a pathological process can be considered, which in turn can have serious consequences, such as the installation of bilirubin encephalopathy or kernicterus, with permanent clinical sequelae resulting from bilirubin toxicity in the patient brain (RIBAS, 2012). The causes are diverse and the type of treatment (may be by phototherapy or exchange transfusion) will depend on the bilirubin serum level and other associated factors, such as the presence of blood incompatibility, weight, age and comorbidities (DANTAS, 2017). The investigation of the profile of newborns using phototherapy is a strategy to

identify the main characteristics of this population, in order to improve the scientific knowledge on this subject, still little explored, and to attend the need for research on the subject in northern Brazil. The goal of this study was to describe the clinical profile of newborns using phototherapy in a neonatal reference unit and to delineate the obstetrics and neonatal variables associated with neonatal jaundice.

MATERIALS AND METHODS

It was developed a longitudinal descriptive study with quantitative approach from June to September 2014 at the Santa Casa de Misericórdia do Pará Foundation Hospital, a public reference hospital, for the State of Pará-Brazil, in the care of High Risk Pregnant Women and Newborn, with 170 neonatal beds. The sample consisted of 90 (ninety) newborns and their respective mothers, highlighting neonatal, newborn, maternal and obstetric variables through information contained in the medical records. Children under 28 days with jaundice and on phototherapy who were hospitalized in the neonatology sector were included in the sample. The sample size calculation was performed from a population of 120 newborns using phototherapy, with a 95% confidence interval and a 5% sampling error, resulting in a proposed initial number of 92 participating neonates. The final number of participants obtained was 90 newborns. A spreadsheet (Microsoft Office Excel 2007) containing the collected data was elaborated and submitted to processing in the Statistical Package for Social Sciences (SPSS) software, version 22.0. For the hypothesis of normality of the study, the Kolmogorov-Smirnov test with Lilliefors correction was applied. The multiple linear regression technique was also used to detect the main patterns of similarity, association and correlation between the variables. The research response variable was the Total Bilirubin and Fraction Level, since it is directly related to the intensity of jaundice. The Durbin-Watson test was also used to detect the presence of autocorrelation (dependence) on the residuals of a regression analysis. The research was approved by the Research Ethics Committee of the Santa Casa de Misericórdia do Pará Foundation Hospital (ruling no. 640.197 and Certificate of Presentation for Ethical Consideration no. 28208214.0.0000.5171 from May 2014).

RESULTS

According to the data obtained regarding neonatal characteristics, it was found that 67.7% (n = 60) were born via Caesarian Section (CS), 76.7% (n = 69) of newborns were born under 37 weeks of pregnancy according to the Capurro method, 51.1% (n = 46) of participants were female and in the ratio Weight x Gestational Age 72.2% (n = 65) were Small for Gestational Age (SGA) (Table 1). Regarding the clinical data collected on the newborns, the occurrence of readmission was analyzed, finding that 83.3% (n = 75) needed hospitalization only once (still as a result of birth). Those who needed re-hospitalization, 16.7% of the sample (n = 15), had jaundice as the main reason. A significant percentage, 83.3% (n = 75) were not breastfed in the first hour of life, pointing to respiratory distress as the most common cause. Regarding the feeding route used in the first 24 hours by neonates, the opened orogastric tube (OGT) was predominant in 54.4% (n = 49). Bilitron was the most used equipment in phototherapy comprising a value of 61.1% (n = 55). The onset (in days of life) of phototherapy treatment of the newborns was more

frequent in the period between the 3rd and 5th day of life, corresponding to 58.9% (n = 53) of the sample. The average of treatment duration was 6 days. Only one newborn required exchange transfusion (Table 2).

Table 1. Sample Distribution According to the Neonatal Variables in Absolute Numbers (N) and Percentages (%). Belém-PA, Brazil, 2014

Variable	Mean (SD)	N	%
Gestational Age (GA)	34,62 (2,9)		
< 37		69	76,7
37 - 42		14	15,6
≥ 42		2	2,2
Unknown		5	5,7
Gender			
Female		46	51,1
Male		39	43,3
Unknown		5	5,6
Type of Delivery			
Caesarean Section		60	67,7
Vaginal		30	33,3
Weight X GA			
Adequate-for-Gestational Age (AGA)		15	16,7
Small-for-Gestational Age (SGA)		65	72,2
Large-for-Gestational Age (LGA)		5	5,6
Unknown		5	5,6

SOURCE: Data collected by the authors, 2014.

Table 2. Clinical Variables of the Newborns in Absolute Numbers (N) and Percentages (%). Belém-PA, Brazil, 2014

Variable	Mean (SD)	N	%
Rehospitalization		15	16,7
Yes		75	83,3
No			
Causes of Rehospitalization		10	66,7
Jaundice		2	13,3
Weight Loss			
Others		3	20,0
Breastfed in the First Hour of Life		3	3,3
Yes			
No		75	83,3
Unknown		12	13,3
Causes for not Being Breastfed in the First Hour of Life (N=109)			
Respiratory Distress		66	60,5
Intubation		36	33,0
Others		7	6,4
Feeding Route in the First 24 hours of life			
ORAL		15	16,7
OGT		22	24,4
Opened OGT		49	54,4
Unknown		4	4,4
Type of Equipment		55	61,1
Bilitron			
Bilitron Bed		4	4,4
Bilispot		4	4,4
Unknown		27	30,0
Days of Life in the Beginning of the Treatment	3(2,8)		
1 st day		2	2,2
2 nd day		20	22,2
3 rd , 4 th and 5 th day		53	58,9
6 th and 7 th day		4	4,4
Late		7	7,8
Unknown		4	4,4

SOURCE: Data collected by the authors, 2014.

The maternal and obstetric characteristics are described in Table 3. In the multiple linear regression model, six variables were important: number of prenatal consultations, amount of medication used during pregnancy, age when starting Enteral Nutrition and age when starting phototherapy, number of pregnancies and treatment duration. Among these, the first four variables were significantly associated with jaundice (p-value <0.05) (Table 4).

Table 3. Maternal and Obstetric Characteristics in Absolute Numbers (N) and Percentages (%). Belém-PA, Brazil, 2014

Variable	Mean (SD)	N	%
Maternal Age	24,26 (6,4)	22	24,4
≤ 18 years old			
19 – 30 years old		55	61,1
≥ 30 years old		12	13,3
Unknown		1	1,1
Blood Type		41	45,6
O+			
A+		17	18,9
B+		5	5,6
Others		2	2,2
Unknown		25	27,8
Number of Gestations		45	50,0
Primigravida			
Secundigravida		28	31,1
Multigravida		16	17,8
Unknown		1	1,1
Received Prenatal Care			
Yes		79	87,8
No		7	7,8
Unknown		4	4,4
Number of Prenatal Consultations (N=79)			
< 6 consultations		45	57,0
≥ 6 consultations		34	43,0
Use of Medication		49	54,4
Yes			
No		11	12,2
Unknown		30	33,3
Medications (N=60)		28	46,7
Vitamin Supplement			
Antimicrobial		19	31,7
Antihypertensive		9	15,0
Others		4	6,7
Complications during Pregnancy			
Yes		74	82,3
No		12	13,3
Unknown		4	4,4
Complications (N=153)		38	24,8
Urinary Tract Infection			
Leukorrhea		31	20,2
Bleeding		20	13,1
Others		64	41,8

SOURCE: Data collected by the authors, 2014.

Table 4. Variables Coefficients of Significance

Coefficients ^a					
Model / Variables	Non-Standard Coefficients		Standard Coefficients	t	Sig. (p-value)
	B	Standard Error	Beta		
(Constant)	12,512	1,407		8,894	,000
Number of Prenatal Consultations	-0,249	,144	-,216	-1,724	,040
Amount of Medication/Pregnancy	0,633	,340	,227	1,862	,037
Age (Days)/Beginning of Enteral Nutrition	-0,324	,117	-,317	-2,273	,007
Age (Days)/Beginning of Phototherapy	-0,205	,134	,237	3,027	,004
Treatment Duration (days)	-0,001	,136	-,001	-,010	,992
Number of Gestations	-0,123	0,258	-0,055	-0,479	0,634

SOURCE: Data collected by the authors, 2014.

a. Predictors (Constant): Duration of Phototherapy (days), Number of Prenatal Consultations, Age (days) when it was started Enteral Nutrition, Number of Gestations, Amount of Medication, Treatment Duration (days).

DISCUSSION

The result of the present study highlights about the large number of preterm infants with jaundice. A similar percentage was found in a survey conducted in Santa Catarina, Brazil (84.7%) (GALVAN, 2013). Prematurity is considered a risk factor for the development of hyperbilirubinemia, especially in newborns with 35-37 weeks of gestational age (CORTEY *et al.*, 2017; GONZALEZ, 2012; ARAÚJO *et al.*, 2014). Research indicates that the severity of hyperbilirubinemia is higher in male newborns, possibly due to the slower lung maturation process that contributes to premature birth (ENK *et al.*, 2009; SARI, *et al.*, 2015; MARTINS, 2013). However, this study showed that there was a predominance in females.

Although there is no scientific evidence so far about the direct association between type of delivery and jaundice, prematurity shows up as a direct consequence of the type of delivery, mainly related to the Caesarean Section (CS) rates, as well as the increased risk of infant and perinatal death, even among late preterm infants with adequate birth weight (SOUZA *et al.*, 2013). It is important to emphasize that in the hospital surveyed, the predominance of Caesarean Section may be related to the fact that the institution is a reference hospital for high-risk pregnancy. The prevalence of jaundice being the main cause of newborn rehospitalization is also pointed out in another study (PERAZZINI *et al.*, 2011). Hyperbilirubinemia is a daily experience in the clinical practice at hospitals when it

comes to readmission, therefore, the pathophysiological and therapeutic understanding of this condition deserves to be highlighted (BRASIL, 2011). Usually these readmissions occur mostly between the 4th and 7th day of life. (PAGANINI *et al.*, 2009; GALÍNDEZ-GONZÁLEZ, 2017). The fact that newborns used opened OGT in the first 24 hours of life suggests that newborns did not start the diet on the first day of life, with an average of 3 days for the introduction of enteral nutrition. Prolonged fasting favors neonatal jaundice because it contributes to the absorption of bilirubin in the intestinal light and, consequently, to the increase in blood circulation (DANTAS, 2017; BRAZIL, 2014). On the other hand, many studies show that the minimum nutrition, even at 48 hours of life, has great benefits for the newborn, such as greater tolerance to food, faster weight gain, increased gastrointestinal motility, decreased hospitalization time and reduced bilirubin levels (SCRAFFORD *et al.*, 2013; OLUSANYA *et al.*, 2009; SCRAFFORD *et al.*, 2013). Bilitron was the first phototherapy equipment equipped with 5 Super LED type electronic lamps, emitting exclusively blue light (LOPES; PAES, 2015; OLUSANYA *et al.*, 2015). Serum bilirubin level can reach a peak from 4 to 12 mg/dl around the 3rd to 5th day after birth, being a feature of physiological jaundice (TAMEZ, 2013; RENNIE *et al.*, 2010). Treatment duration was higher when compared to other studies (CARVALHO *et al.*, 2018; SOUSA; SENA, 2012). This may be related to excessive handling of the newborn, prolonged phototherapy suspension, improper use and distance of the equipment. The result of the research shows that the prevalence of age between 19 to 30 years is, from a biological point of view, favorable for the conception of pregnancy, a period of greater fecundity for women (VIERA *et al.*, 2012; SILVA *et al.*, 2015). The predominant blood type was O+, the same result obtained in studies conducted in the states of Ceará and Paraná, Brazil (VIERA *et al.*, 2012; DANTAS, 2017). The fact that half of women were primigravidas was different from other studies, since multiparity is a predictive factor for jaundice (GONZALEZ; URÍA; MORÁN, 2010; SOUSA; SENA, 2012).

According to the data collected, it was noticed that even with the information that most of them had prenatal care, it cannot be concluded that they had been adequately monitored as indicated by the Ministry of Health, because most of these mothers were consulted less than 6 times. (BRAZIL, 2011; MONTENEGRO; REZENDE FILHO, 2011). In a study conducted at the same institution that this research with newborns took place, pointed out to maternal profile with predominance of incomplete prenatal care associated with complications (CHERMONT *et al.*, 2019). It is necessary to highlight in the present study that among the women who used medication, 12 used more than one medication during pregnancy. A complete perinatal history is of great importance for understanding the cause of jaundice, as well as the use of medications that are a risk factor for hyperbilirubinemia (MAISELS, 2007). In a study placed in Portugal that aimed to characterize the population of newborns who developed jaundiced, antibiotics were the most referred medications (MARTINS, 2013). Urinary tract infections are among the complications, which are significantly associated with severe hyperbilirubinemia and acute bilirubin encephalopathy (GUNDUR, 2010; FERREIRA, 2011; MANNING *et al.*, 2007). The variables associated with jaundice occurrence (p-value <0.05) were the number of prenatal appointments, the amount of medication used during pregnancy, the age of

newborns when it was initiated enteral nutrition and the age of newborns when it was initiated phototherapy. It is noteworthy that not all variables subjected to investigation in this research were statistically associated with neonatal jaundice and the use of phototherapy (approximately 42% were predictive). However, this research indicates the need for investigation of other variables not covered in this study.

Conclusion

The results of this study made it possible to trace the profile of jaundiced newborns on phototherapy through the analysis of maternal and neonatal variables, pointing out as peculiarities of this study, the higher frequency on females, predominance of primigravidas, and the most frequently associated variables with jaundice were: use of medications during pregnancy, initiation of enteral nutrition and age of newborn when it was started phototherapy. Most variables are in line with publications on the subject, however others stood out with evidence in the sample studied, indicating peculiarities among the newborns submitted to this research.

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REFERENCES

- Araújo IRB, *et al.* Assistência de enfermagem ao recém-nascido com icterícia neonatal: uma revisão integrativa. *Rev Enferm.* 2014;3(1):120-24.
- Brasil. Ministério da Saúde. Atenção à saúde do recém-nascido: guia para os profissionais de saúde – Intervenções comuns, icterícia e intervenções. 2 ed., vol. 2. Brasília: editora MS, 2014.
- Brasil. Ministério da Saúde. Grupo Hospitalar Conceição. Gerência de Saúde Comunitária. Atenção à saúde da gestante APS. Porto Alegre: Hospital Nossa Senhora da Conceição. 2011. 240p.
- Brasil. Ministério da Saúde. Secretaria de Atenção à Saúde. Departamento de Ações Programáticas e Estratégicas. Manual AIDPI neonatal: quadro de procedimento. Brasília: Ministério da Saúde; 2012. 3rd ed. 228p. (Série A. Normas e Manuais Técnicos).
- Brasil. Ministério da Saúde. Secretaria de Atenção à Saúde. Departamento de Ações Programáticas e Estratégicas. Atenção à saúde do recém-nascido: guia para os profissionais de saúde: cuidados gerais. Brasília: Ministério da Saúde; 2014. v. 2. 164p. (Série A. Normas e Manuais Técnicos).
- Carvalho EG, *et al.* Perfil epidemiológico de neonatos icterícos internados em uma unidade de cuidados progressivos neonatais. *Rev Med Minas Gerais.* 2018;28 (Supl 2):S23-S127.
- Cortey A, *et al.* Ictère à bilirubine non conjuguée du nouveau-né de 35 semaines et plus: du dépistage au suivi après sortie de la maternité. *Recommandations pour la pratique clinique. Archives de Pédiatre.* 2017;24(2):192-203.
- Dantas AVVC. Capacidade preditiva e prognóstica das características definidoras do diagnóstico de enfermagem icterícia neonatal. [Dissertação]. Universidade Federal do Ceará (Ceará), 2017. 72p.
- Enk I, *et al.* Icterícia como causa de internação neonatal: a experiência em um serviço terciário de Porto Alegre, RS. *Revista da AMRIGS.* 2009;53(4):361-67.

- Ferreira DMVD. Será possível melhorar o diagnóstico da icterícia neonatal? Aplicação de técnicas de Data Mining. [Dissertação]. Centro Hospitalar do Tâmega e Sousa (Portugal), 2011. 122p.
- Galíndez-González AL, *et al.* Factores predisponentes para icterícia neonatal en los pacientes egresados de la UCI neonatal, Hospital Infantil los Ángeles de Pasto. Univ. Salud. 2017;19(3):352-358.
- Galvan L, *et al.* Causas de icterícia em neonatos internados em hospital no sul de Santa Catarina. Arq. Catarin Med. 2013;42(3):47-53.
- Gonzalez AC, *et al.* Hiperbilirrubinemia neonatal agravada. Rev. Cubana Pediatr. 2010;82(3):13-19.
- Gonzalez AC. Comparación de dos métodos diagnósticos de icterícia neonatal. Rev. Cubana Havana. 2012;84(1):67-72.
- Gundur NM, *et al.* Natural history and predictive risk factors of prolonged unconjugated jaundice in the newborn. Pediatr Int. 2010;52(5):769-72.
- Lopes LC, Paes IADC. Possíveis diagnósticos e intervenções da enfermagem a neonatos em fototerapia. Revista Científica da FHO|UNIARARAS. 2015; 3(2): 16-20.
- Maisels MJ. Fisiologia e tratamento do Recém-Nascido. Rio de Janeiro: Guanabara Koogan, p.703-777. 2007.
- Manning D, *et al.* Prospective surveillance study of severe hyperbilirubinaemia in the newborn in the UK and Ireland. Arch Dis Child Fetal Neonatal. 2007; 92(5):342-46.
- Martins FR. Icterícia neonatal: caracterização populacional e repercussões no neurodesenvolvimento ao longo ao longo dos primeiros três anos de vida. [Dissertação]. Universidade da Beira Interior (Covilhã-Portugal), 2013. 43p.
- Montenegro CAB, Rezende Filho J. Rezende - Obstetrícia Fundamental. In: Montenegro CAB, Rezende Filho J. Propedêutica da Gravidez. Rio de Janeiro: Guanabara Koogan; 2011. p. 105-13.
- Olusanya BO, *et al.* Management of late-preterm and term infants with hyperbilirubinaemia in resource-constrained settings. BMC Pediatrics. 2015;15:39.
- Olusanya BO, *et al.* Infants with severe neonatal jaundice in Lagos, Nigeria: incidence, correlates and hearing screening outcomes. Trop Med Int Health. 2009; 14(3): 301-10.
- Paganini CBL, *et al.* Icterícia neonatal: fatores de risco para reinternação em uma população de recém-nascidos na cidade de São Paulo. Arq Med Hosp Fac Cienc Med Santa Casa São Paulo. 2009; 54(2):51-5.
- Perazzini F, *et al.* Acompanhamento sistematizado da hiperbilirrubinemia em recém-nascidos com 35 a 37 semanas de idade gestacional. J Pediatr (Rio J). 2011;87(4):301-06.
- Rennie J, *et al.* Neonatal jaundice: summary of nice guidance. BMJ. 2010;340(2):2409-12.
- Ribas AL. Icterícia Neonatal. In: Figueiredo AF, Machado WCA. Tratado de Cuidados de enfermagem. São Paulo: Roca. 2012; p.1990-93.
- Sari S, Yavuz A, Batur A, Bora A, Caksen H. Brain magnetic resonance imaging and magnetic resonance spectroscopy findings of children with kernicterus. Polish J Radiol. 2015; 80:72-80.
- Scrafford CG, *et al.* Incidence of and risk factors for neonatal jaundice among newborns in southern Nepal. Tropical Medicine and International Health. 2013; 18(11):1317-28.
- Silva ACD, *et al.* Fatores associados ao desenvolvimento neuropsicomotor em crianças de 6-18 meses de vida inseridas em creches públicas do Município de João Pessoa, Paraíba, Brasil. Cad. Saúde Pública. 2015;31(9):1881-93.
- Sousa ABM, Sena DSL. Hiperbilirrubinemia neonatal: Considerações sobre fisiopatogenia, modalidades terapêuticas e complicações. Revista FACID: Ciência & Vida. 2012;8(2):17-25.
- Souza KCL, *et al.* Perfil dos recém-nascidos submetidos à estimulação precoce em uma unidade de terapia intensiva neonatal Rev Bras Promoc Saude. 2013; 26(4):523-29.
- Tamez RN. Enfermagem na UTI neonatal: assistência ao recém-nascido de alto risco. 5. ed. Rio de Janeiro: Guanabara Koogan, 2013.
- Thielemans L, *et al.* Hanboonkunupakarn B, Van Hensbroek MB, Van Rheenen P, Paw MK, Nosten F, Mcgready R, Carrara VI. Neonatal Hyperbilirubinemia in a Marginalized Population on the Thai-Myanmar Border: a study protocol. BMC Pediatr. 2017;17(1):32.
- Viera CS, *et al.* Perfil epidemiológico da díade mãe-bebê internados em alojamento conjunto obstétrico de um hospital universitário para tratamento de hiperbilirrubinemia do recém-nascido. Acta Scientiarum Health Science. 2012; 34(1):103-12.
