Original Article

Assessment of knowledge and practice of Baghdadi pediatricians regarding the management of neonatal hyperbilirubinemia

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Summary:

Background: Management of hyperbilirubinemia remains a challenge for neonatal medicine because of the risk for serious neurological complications related to the toxicity of bilirubin.

Objectives: This study aimed to assess the knowledge and practice of a sample of Baghdadi pediatricians regarding the risk factors, management of hyperbilirubinemia.

Subjects and Methods: This survey study was conducted from 1st of March 2011 to 31st December 2011, 10 questions questionnaire was handled to a random sample of 100 Arab and Iraqi board certified pediatricians in Baghdad who is working in governmental hospitals and/or in private sector. These questions include various aspects of neonatal hyperbilirubinemia management.

J Fac Med Baghdad
2013; Vol.55, No. 2
Received: Feb., 2012
Accepted April, 2013

Results: Thirty four percent of pediatricians had 5-10 years of practice since completion of residency, 54% of pediatricians serve about 50 -100 neonates / year ($P < 0.001$), 60% of physicians manage <10 cases of kernicterus / year ($p < 0.001$), 86.9% of pediatricians thought that severe hyperbilirubinemia and kernicterus should be in the first place a concern of Primary Health Centers(PHC) ($P < 0.001$), 58% of pediatricians thought that phototherapy should be started when the Total Serum Bilirubin (TSB) level in the first 24 hours of life is 5-10 mg/dl, 63% of pediatricians agreed that TSB of 15 mg/dl need phototherapy, while 17% considered a TSB >15 mg/dl need phototherapy ($P= 0.0001$), 56% of pediatricians regarded a TSB level of 20 mg/dl in 25-48 hours of life need exchange transfusion if phototherapy failed ($P=0.000$), 76% believed "to a very high degree" that jaundice presenting in the first 24 hours is a significant risk factor for the development of hyperbilirubinemia in term infants, 44% believed that the post-discharge TSB follow up is vital to lower the incidence of neurologic complication, while 56% thought it would not affect the prognosis ($P = 0.12$).

Conclusions: Most Baghdadi pediatricians devitalize the post- discharge follow up of TSB and underestimate its role in decreasing the incidence of undiagnosed neonatal jaundice, and they thought that severe hyperbilirubinemia and kernicterus should be in the first place a concern of PHCs.

Key words: Assessment, knowledge, practice, Baghdadi pediatrician, management, Neonatal hyperbilirubinemia.

Introduction:

Hyperbilirubinemia in infants ≥ 35 weeks gestation is defined as a TSB >95th percentile for hours-of-age on the Bhutani nomogram .[1]

The major risk factors for severe hyperbilirubinemia includes: Pre-discharge Total Serum Bilirubin (TSB) or transcutaneous bilirubin (TcB) in a high-risk zone defined as >95th percentile for age[2], Jaundice within the first 24 hours of life[2,3], Hemolytic disease [2], Gestational age 35 to 36 weeks[4,5], Previous sibling who received phototherapy [5,6],Cephalhematoma or significant bruising from birth trauma[4], Exclusive breast feeding, particularly if nursing is not going well and weight loss is excessive (>12 percent of birth weight).[4,5]

Management of hyperbilirubinemia remains a challenge for neonatal medicine because of the risk for serious neurological complications related to the toxicity of bilirubin.[7]

The prevention of bilirubin encephalopathy is based on the detection of infants at risk for developing significant hyperbilirubinemia and the early treatment of this condition. [8]The prevention of significant hyperbilirubinemia includes; Protocols using the hour-specific bilirubin nomogram, physical examination and clinical risk factors have been successful in identifying patients at risk for hyperbilirubinemia and candidates for targeted management. Any infant who is jaundiced before 24 hours requires measurement of the serum bilirubin level and, if it is elevated, the infant should be evaluated for possible hemolytic disease. Follow-up should be provided within 2–3 days of discharge to all neonates discharged earlier than 48 hours after birth. Early follow-up is particularly important for infants younger than 38 weeks' gestation.[2]

Approximately 66% of the pediatricians reported an awareness of the neonatal hyperbilirubinemia clinical practice guidelines

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published in 1994. [9] Atkinson et al showed that only 54% of the pediatricians initiated treatment in accord with the recommended parameters.[10].

Subjects and Methods

This survey study was conducted from 1st of March 2011 to 31st December 2011, a 10 questions questionnaire was handled to a random sample of 100 Arab and Iraqi board certified pediatricians in Baghdad, Iraq, who is working in governmental hospitals (Children Welfare Teaching hospital, Al kadhimya Hospital &Central Teaching Hospital of Children) and/or in private sector regardless of the years of their practice and the areas they cover by their services.

The questionnaire included 10 questions; the questions addressed various aspects of neonatal hyperbilirubinemia management such as pre-discharge bilirubin testing , follow up of infants who were jaundiced at discharge, treatment approaches used for the management of neonatal hyperbilirubinemia, and primary health centers' role in handling these conditions. All questions were designed using a yes/no and single choice format. A scale type format (hardly at all, to a small degree, to a moderate degree, to a very high degree, and not applicable) was used to assess the pediatrician's knowledge & practice regarding the risk factors for severe hyperbilirubinemia.

The following risk factors were included: Jaundice presenting in first 24 hours, jaundice noted at discharge, previous siblings with jaundice, gestational age between 37 and 38 weeks, breast feeding, bruising/cephalhematoma, Rh and ABO incompatibility and lastly glucose- 6-phosphate dehydrogenase (G-6-PD) deficiency.

The pediatricians were also asked questions regarding the hour specific TSB that they used for the initiation of phototherapy and/or exchange transfusion in term neonates, also pre- and post-discharge neonatal hyperbilirubinemia management was assessed.

It was also decided to know the pediatricians' opinion on whether severe hyperbilirubinemia and kernicterus should be considered in the first place a public health center (PHC) concern or not.

It was standardized in our survey that the questionnaire with less than 50% of the questions answered by a pediatrician would not be included in the study.

A computerized statistical analysis was performed using SPSS v.16 software for windows. All data were entered and appropriate statistical procedures were performed. Student's (t) test was used to compare mean number of neonate served per year in between groups. Chi (X^2) and fisher exact tests were used to compare categorical variables(year of practice, area covered by physicians, cases of Kernicterus, opinion about hyperbilirubinemia priority, phototherapy, exchange transfusion, risk factors and TSB levels). Multi-variate analysis and multiple response definition tests were used to find the differences in opinions within each and in between groups. All statistical tests were performed as two tailed and the level of significance was set at P.value ≤ 0.05 to be considered as significant.

Results:

All 100 Pediatricians were included in the result analysis, i.e. they fulfilled the inclusion criteria. The pediatricians were divided into 2 groups: Group A: representing pediatricians in private sector. Group B: for pediatricians working in governmental hospitals.

Thirty four percent of pediatricians had 5-10 years of practice since completion of residency, while only 15% had <5 years of practice after residency (Table 1).

Regarding area mostly covered by services of these pediatricians (urban, rural, or mixed), there was no significant difference between both groups, (Table 1).

It had been found that 54% of pediatricians serve about 50 -100 neonate per year, P.value was highly significant < 0.001(table 2), while 60% of physicians manage less than 10 cases of kernicterus per year, P.value was highly significant < 0.001,(table 2).

Besides, 86(86.9%) of pediatricians thought that severe hyperbilirubinemia and kernicterus should be in the first place a concern of PHC, while 13(13.1%) thought it is not in the first place a concern of PHC, P.value was highly significant < 0.001. One pediatrician gave no answer for this question and it had been excluded from the calculation.

With a highly significant level (P<0.00023), about 58% of pediatricians thought that phototherapy should be started when the TSB level in the 1st 24 hr. of life is 5-10 mg/dl while only 10% of them preferred a higher level(>10 mg/dl),(table 3).

Regarding hour specific TSB in 25-48 hr. of life, 63% of pediatricians agreed that TSB of 15 mg/dl indicates the start of phototherapy, while only 17% considered a TSB >15 mg/dl is the start of phototherapy, P= 0.0001, (table 3).

Fifty six percent of pediatricians regarded a TSB level of 20 mg/dl in 25-48 hr. of life an indicator of exchange transfusion if phototherapy failed, while only 8% considered a lower level (<20 mg/dl), P=0.0001, (table 3).

The pediatricians' response regarding risk factors for the development of severe neonatal hyperbilirubinemia is presented in (table 4), (76%) believed "to a very high degree" that jaundice presenting in the first 24 hours is a significant risk factor for the development of hyperbilirubinemia in term infants. Rh/ABO incompatibility was thought to be a moderate risk factor. A considerable percentage believed "to a very high or moderate degree" that G6PD deficiency was a significant risk factor. Bruises, cephalhematoma, gestational age of 37 - 38 wk, breast feeding, jaundice noticed at discharge and a previous sibling with jaundice were rated as risk factors for hyperbilirubinemia with only a small or moderate degree of belief.

Regarding the opinion of pediatricians about the post-discharge TSB follow up, 44% believed it was vital to lower the incidence of neurologic complication, while 56% thought it would not affect the prognosis. P. value= 0.12 (not significant).

Table 1: Years of practice of pediatricians since completion of residency and areas of practice

Period (year)		Group			
		A	B	Total	
<5	Count	1	14	15	
	% within group	1.9%	30.4%	15.0%	
5-10	Count	20	14	34	
	% within group	37.0%	30.4%	34.0%	
10-20	Count	18	10	28	
	% within group	33.3%	21.7%	28.0%	
>20	Count	15	8	23	
	% within group	27.8%	17.4%	23.0%	
Total	Count	54	46	100	
	% within group	100.0%	100.0%	100.0%	
Area					P-Value
Rural	Count	12	9	21	0.30
	% within group	22.2%	19.6%	21.0%	
Urban	Count	10	4	14	
	% within group	18.5%	8.7%	14%	
Mixed	Count	32	33	65	
	% within group	59.3%	71.7%	65%	
Total	Count	54	46	100	
	% within group	100%	100%	100%	

Table 2: Number of neonates served by pediatricians and number of Kernicterus cases per year.

Neonate \ year		Group			P. value
		A	B	Total	
Number of neonates served per year by pediatricians.					
10-50	Count	18	12	30	0.0001
	% within group	33.3%	26.1%	30%	
50-100	Count	27	27	54	
	% within group	50%	58.7%	54%	
>100	Count	9	7	16	
	% within group	16.7%	15.2%	16%	
Total	Count	54	46	100	
	% within group	100%	100%	100%	
Mean		68	70	69	
Std Deviation		31	29	30	
Number of Kernicterus cases per year managed by pediatricians.					
Case \ year					
<10	Count	38	22	60	0.0001
	% within GROUP	70.4%	47.8%	60%	
10-50	Count	15	21	36	
	% within GROUP	27.8%	45.7%	36%	
>50-100	Count	1	3	4	
	% within GROUP	1.9%	6.5%	4%	
Total	Count	54	46	100	
	% within GROUP	100%	100%	100%	

Table 3: Opinion of pediatricians about the time of starting phototherapy, and Exchange transfusion if phototherapy failed

TSB level		Group			p-value
		A	B	Total	
Opinion of pediatricians about starting phototherapy depending on the level of TSB in 1st 24 hr. of life					
3-5 mg/dl	Count	21	11	32	0.00023
	% within group	38.9%	23.9%	32.0%	
5-10 mg/dl	Count	30	28	58	
	% within group	55.6%	60.9%	58.0%	
>10 mg/dl	Count	3	7	10	
	% within group	5.6%	15.2%	10.0%	
Total	Count	54	46	100	
	% within group	100.0%	100.0%	100.0%	
Opinion of pediatricians about hour specific TSB to start phototherapy in 25-48 hr. of life					
<15mg/dl	Count	18	2	20	0.0001
	% within group	33.3%	4.4%	20.0%	
15 mg/dl	Count	19	44	63	
	% within group	35.2%	95.7%	63.0%	
>15mg/dl	Count	17	0	17	
	% within group	31.5%	0%	17.0%	
Total	Count	54	46	100	
	% within group	100.0%	100.0%	100.0%	
Opinion of pediatricians about Exchange transfusion if phototherapy failed, depending on the level of TSB in 25-48 hr. of life					
<20 mg/dl	Count	3	5	8	0.0001
	% within group	5.6%	10.9%	8.0%	
20 mg/dl	Count	16	40	56	
	% within group	29.6%	87.0%	56.0%	
>20 mg/dl	Count	35	1	36	
	% within group	64.8%	2.2%	36.0%	
Total	Count	54	46	100	
	% within group	100.0%	100.0%	100.0%	

Table 4:Opinion of pediatricians about the risk factors for severe hyperbilirubinemia and kernicterus

Risk Factor	Hardly at risk	To As mall degree	To a moderate degree	To a very high degree	Not applicable	Total	P.value
Jaundice at 1st 24 hrs	3	3	18	76	0	100	0.0002
Jaundice noticed at discharge	11	43	34	10	2	100	0.0001
Previous sibling with Jaundice	14	45	34	4	3	100	0.0001
Bruises, cephalhematoma	3	40	45	10	2	100	0.0001
Rh, ABO incompatibility	12	27	61	-	-	100	0.0001
G6PD deficiency	10	15	32	43	-	100	0.0001
Gestational age 37 - 38 wk	16	52	30	1	1	100	0.0001
Breast feeding	9	41	44	3	3	100	0.0001

Discussion:

The result of this population-based survey showed overall uniformity with the 2004 American Academy of Pediatrics (AAP) recommendations in the management of neonatal hyperbilirubinemia prior to discharge [12], also with a similar survey made in New Jersey/ USA.[13]

It was agreed by most pediatricians (58%) that phototherapy should be started in the first 24 hours of life according to hours specific TSB levels as recommended by AAP.[12]

In the 25-48 hours of life, practices of (63%) of pediatricians regarding TSB levels needing phototherapy were similar to that of New Jersey [13]; both were close to AAP recommendations .[12]

Hour specific TSB indicating exchange blood transfusion in the 24-48 hours of life preferred by (56%) of pediatricians in current survey, which was similar to New Jersey survey results [13], and were within the range recommended by AAP [12]; however it was a little bit lower than levels recommended by the Canadian Paediatric Society (CPS). [14]

The results of evaluation of risk factors for severe hyperbilirubinemia and kernicterus (very high degree, moderate degree, and to a small degree risk factors) showed a great similarity between the current survey and New Jersey's [13]; whereas another study in USA [15] described gestational age <38 weeks and breast feeding as very important risk factors vs. small to moderate degree risk factors in our study.

In addition, a study held in Baghdad [16] concluded that ABO and Rh incompatibility were "not so significant" risk factors vs moderate degree risk factors in the current survey. This dissimilarity may be because known risk factors for severe hyperbilirubinemia were overwhelmed by the effect of advanced acute bilirubin encephalopathy. [16]

Fifty-Six percent of pediatricians in the current survey did not consider post-discharge TSB monitoring a vital step to lower the incidence of bilirubin induced neurologic complications, disagreeing with both the New Jersey physicians' practices [13] and the results of a similar study in Pennsylvania/ USA. [1]

These practices shown in the current survey may contribute to the development of undiagnosed or complicated pathological neonatal jaundice [17, 18]; and may explain why the risk of kernicterus was reduced in USA from its peak in the 1950s through the 1970s, although isolated cases of kernicterus continue to be reported.[1,19]

However, (86.9%) of surveyed pediatricians in current study as well as in that of New Jersey thought that severe hyperbilirubinemia and kernicterus should be in the first place a concern of PHC. [13]

Conclusions:

Most of Baghdadi pediatricians devitalize the post- discharge follow up of TSB and underestimate its role in decreasing the incidence of undiagnosed neonatal jaundice, and they thought that severe hyperbilirubinemia and kernicterus should be in the first place a concern of PHCs.

We recommend activating the primary health center role in early management of neonatal jaundice, trying to prevent its dangerous complication, through continuous and regular educational sessions. Stress on post-discharge TSB follow up; especially in high risk neonates to manage severe neonatal jaundice at early possible time to prevent its complications.

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