

Research Article

Assessment of knowledge on causes and care of neonatal jaundice at the Nigerian primary and secondary health institutions

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ABSTRACT

Background: Neonatal jaundice is the most common condition that requires medical attention in new-borns. However, missed diagnosis of jaundice, poor monitoring, and prescriptions of wrong and ineffective medications by the health workers for jaundice are known to be responsible for the persistence of acute bilirubin encephalopathy in the sub region. Therefore, the aim of the present study was therefore to assess the knowledge in the care of neonatal jaundice at the primary and secondary health care delivery in Nigeria so as to improve it.

Methods: A cross-sectional study conducted at 12 local government primary health and maternity centers and 2 state owned general hospitals (secondary health facilities) in Osun State, Southwest Nigeria between January and June 2014. Consent was obtained from the health workers at the health facilities. A structured questionnaire was administered to all the staffs on duty and during the shifts of duty. The questionnaire contained questions to assess the knowledge of the health workers with regard to neonatal jaundice causes, treatment and complications. Staff judgment on the effectiveness of methods and drugs being prescribed were also assessed.

Results: One hundred and forty one (67.5 percent) were primary health care workers and 68 (32.5percent) were staff in secondary health care facilities. There was significantly better understanding of causes, management and complications of neonatal jaundice among secondary health care workers than primary health care workers (p at least 0.007). Common pharmacological agents prescribed were Ampiclox (Ampicillin-Claxacillin formulation), Glucose water, Multivitamins, phenobarbitone, other antibiotics and injections at both health care levels.

Conclusions: There is therefore urgent need to train health workers of all cadres on causes, care, effective treatment and complications of neonatal jaundice to reduce the high prevalence of bilirubin encephalopathy. Facilities like effective phototherapy units should be made available at health facilities and training centres.

Keywords: Assessment, Knowledge, Health workers, Neonatal jaundice, Nigeria

INTRODUCTION

Neonatal jaundice which is yellow coloration of the skin and sclera in newborns from the accumulation of unconjugated bilirubin occurs in most newborn infants and it is the most common condition that requires medical attention in newborns. Most jaundice is benign (physiological) and usually need no treatment as it resolves within two weeks. However, the diagnosis of

physiological jaundice is retrospective because sometimes jaundice can start with bilirubin in the physiological range and then escalate or become prolonged or show signs of cholestasis.¹ More importantly is the neurotoxicity (acute bilirubin encephalopathy) or death in newborns and lifelong neurologic sequelae in infants who survive (kernicterus) from excessive rise of unconjugated bilirubin. For these reasons, newborn infants with jaundice must be identified

early and the level of jaundice monitored to identify those who might develop severe jaundice, acute bilirubin encephalopathy and kernicterus.

Severe neonatal jaundice is 100-fold more frequent in Nigeria than in industrialized countries¹ Acute bilirubin encephalopathy (ABE) is also very common in Nigeria.² It is known that missed diagnosis of jaundice, trivializing all cases of neonatal jaundice, poor monitoring, prescriptions of wrong and ineffective medications for jaundice has been found responsible for the persistence of acute bilirubin encephalopathy and cerebral palsy in the subregion.² Among the babies who presented late with acute bilirubin encephalopathy in a teaching hospital, about 80% were seen by at least a health worker 24 hr. before the brain damage and were given ineffective prescription, wrong counsel and reassurance.²

Primary and the secondary health facilities and the workers are the closest health care providers to the community in terms of availability, accessibility and affordability. The role of primary and secondary health care levels is very critical to neonatal jaundice management. Parents heavily depend in most cases on the advice and care being provided by these facilities without cross checking whether they are right or not. The aim of the present study therefore, was to assess the knowledge and ongoing practices in the care of neonatal jaundice at the primary and secondary health care delivery in Nigeria so as to improve it.

METHODS

This was a cross-sectional study conducted at twelve local government primary health and maternity centers and two state owned general hospitals (secondary health facilities) in Osun State, Southwest Nigeria between January and June 2014. These centers were chosen because of their closeness in terms of location to the tertiary hospitals in the State. It was assumed that their geographical closeness to the two teaching hospitals would bring the knowledge and practice in them close to the optimum.

Consent was obtained from the health care workers. A structured questionnaire was administered to all the staffs on duty during the shifts of duty. Excluded was those staff that was off duty or on leave. The questionnaire contained questions on years of experience, questions to assess the knowledge of the health workers with regard to neonatal jaundice causes, treatment and complications. Staff judgment on the usual counsel to mothers of babies with jaundice and the effectiveness of treatment usually prescribed. Mode and places of referral were also assessed. The data generated were entered into HP personal computer and analyzed with the Statistical Package for the Social Sciences (SPSS version 17). Simple frequencies and chi-square test of significance were calculated. The level of significance was taken as $p < 0.05$.

RESULTS

The Respondents: Location, Experience and Post Held

Out of three and forty three hundred questionnaires, 238 were filled and returned covering 12 primary health facilities and 2 state hospitals in the State. Twenty nine questionnaires were not analyzed because of inappropriate entries and confusing information. Only the 219 questionnaires returned and appropriately filled were analyzed. One hundred and forty one (67.5 percent) were birth attendants at the primary health care centers and 68 (32.5percent) were staff in secondary health care facilities.

Of the 141 respondents at the Primary health care centers, 17 were Nursing officers, 8 Chief Community Health officers, 9 Chief Community Health Extension Workers (CHEW), 14 Principal CHEW, 26 CHEW, 32 Junior CHEW and 35 Health Assistants.

Details of the 68 respondents at the secondary health care were 5 Chief Nursing Officers, 7 Assistant Chief Nursing Officers, 10 Principal Nursing Officers and 39 Nursing officers and 7 CHEW.

The years of experience in practice ranged between 2 and 32 years and average of 13.7 years among secondary health care workers while the range was between 1 and 34 years and average of 17.8 years among the primary level health workers.

Knowledge of neonatal jaundice causes and treatment

Table I shows the comparison of knowledge of neonatal jaundice causes and treatment among primary and secondary health care birth workers. There was significantly better understanding of neonatal jaundice causes such as blood group incompatibility, G6PD deficiency, low birth weight and infection among secondary health care workers than primary care workers (p at least 0.007). Similarly, secondary health care workers were better informed on appropriate approach to management of neonatal jaundice like the need for referral, laboratory tests to determine the cause(s) and severity, possible treatment options like phototherapy and/or exchange blood transfusion when severe ($p=0.000$).

Counsel of health workers to mothers on the modalities of treatment for neonatal jaundice

Table II shows the comparison of usual counsel of health workers to mothers of babies with neonatal jaundice on the treatment of jaundice in their babies. The secondary health care workers significantly counseled better on the need for follow up, need for phototherapy and need/or exchanged blood if severe.

Table 1: Comparison of knowledge of neonatal jaundice causes and treatment among Primary and Secondary Health Care Birth Attendants.

Variable	Primary Health Care Workers n(% of 141)	Secondary health workers n (% of 68)	χ^2	p value
Knowledge blood group incompatibility as cause of jaundice				
• Good	62 (44.0)	64 (94.1)		
• Poor	79 (56.0)	04 (5.9)	48.2	0.000
Knowledge of G6PD deficiency as cause of jaundice				
• Good	13 (9.2)	34 (50.0)		
• Poor	128 (90.8)	34 (50.0)	43.8	0.000
Knowledge of neonatal infection as a cause of jaundice				
• Good	74(52.5)	49(72.1)		
• Poor	67(47.5)	19(27.9)	7.3	0.007
Knowledge of drugs or substances that can provoke jaundice in some babies				
• Good	54(38.3)	47(69.1)		
• Poor	87(61.7)	21(30.9)	17.5	0.000
Knowledge of low birth weight (unusually small) babies predispose to severe jaundice				
• Good	74(52.5)	59(86.8)		
• Poor	67(47.5)	9(13.2)	122.4	0.000
Knowledge of the need for babies with jaundice to have referral for laboratory tests to determine the cause(s) and severity				
• Good	58(41.1)	54(79.4)		
• Poor	83(58.9)	14(20.6)	34.1	0.000
Knowledge of use of phototherapy for treatment for jaundice				
• Good	34(34.1)	60(82.4)		
• Poor	107(75.9)	08(17.6)	27.0	0.000
Knowledge of use of exchange blood transfusion as treatment for severe jaundice				
• Good	23(16.3)	42(61.8)		
• Poor	118(83.7)	26(38.2)	44.2	0.000
Knowledge of risk of brain damage (kernicterus) occurring in severe jaundice				
• Good	31(22.0)	58(55.9)		
• Poor	110(78.0)	10(44.1)	75.2	0.000
Knowledge of risk of death in severe jaundice				
• Good	71(50.4)	55(80.9)		
• Poor	70(49.6)	13(19.1)	17.9	0.000
Knowledge of danger of exposing baby to unfiltered sunlight to treat jaundice				
• Good	23(16.3)	37(54.4)		
• Poor	118(97.9)	31(45.6)	32.5	0.000

Table 2: Comparison of frequency of usual counsel to mothers on the modalities of treatment of neonatal jaundice of health workers among Primary and Secondary Health Care Birth Attendants.

Method	Primary Health Care Birth Attendants n=141			Secondary Health Care Midwives n=68			p-value
	Always n (%)	Sometimes n (%)	Never n (%)	Always n (%)	Sometimes n (%)	Never n (%)	
Need no treatment	10(7.1)	47(33.3)	84(59.6)	28(41.2)	22(32.4)	18(26.5)	0.000
Need referral	21(14.9)	54(38.3)	66(46.8)	22(32.4)	15(22.1)	31(45.6)	0.005
Need laboratory test	39(27.7)	38(27.0)	64(45.4)	28(41.2)	17(25.0)	23(33.8)	0.1
Need observation	43(30.5)	65(46.1)	33(23.4)	18(26.5)	27(39.7)	23(33.8)	0.2
Need follow up in the health unit	19(13.5)	54(38.3)	68(48.2)	18(26.5)	25(36.8)	25(36.8)	0.06
May need Phototherapy (Special treatment light)	31(22.0)	15(10.6)	95(67.4)	45(66.2)	14(20.6)	9(13.2)	0.000

Table 3: Comparison of frequency of prescription for neonatal jaundice among 141 Primary and 68 Secondary Health Care Birth Attendants.

Method	Primary Health Care Birth Attendants n=141			Secondary Health Care Midwives n=68			p-value
	Always n (%)	Sometimes n (%)	Never n (%)	Always n (%)	Sometimes n (%)	Never n (%)	
Use of Pharmacological agent							
Ampiclox	71(50.4)	54(38.3)	16(11.3)	12(17.6)	38(55.9)	18(26.5)	0.000
Glucose water	85(60.3)	42(29.8)	14(9.9)	22(32.4)	26(38.2)	20(29.4)	0.000
Multivitamins	69(48.9)	67(47.5)	5(3.5)	34(50.0)	10(14.7)	24(35.3)	0.000
Other antibiotics and injections	43(30.5)	65(46.1)	33(23.4)	10(14.7)	15(22.1)	43(63.2)	0.000
Phenobarb	54(38.3)	50(35.5)	37(26.2)	23(33.8)	29(42.6)	16(23.5)	0.4
Use of Non-Pharmacologic agent							
Pawpaw leaves in water	39(27.7)	59(41.8)	43(30.5)	8(11.8)	11(16.2)	49(72.0)	0.000
Pawpaw seed in water	39(27.7)	64(45.4)	38(27.0)	8(11.8)	9(13.2)	51(75.0)	0.000
Camphor (Naphthalene balls) in water	28(19.9)	33(23.4)	80(56.7)	2(2.9)	5(7.4)	61(89.7)	0.000
Herbs/Native Concoctions	23(16.3)	12(8.5)	106(75.2)	2(2.9)	5(7.4)	61(89.7)	0.005
Scarification marks	0(0.0)	03(2.2)	138(97.8)	0(0.0)	0(0.0)	68(100.0)	0.6
Exposure to early morning sunlight	118(83.7)	19(13.5)	4(2.8)	47(69.1)	15(22.1)	6(8.8)	0.04
No treatment at all	12 (8.5)	45(31.9)	84(59.6)	28(41.2)	26(38.2)	14(20.6)	0.000

Frequency of prescription for neonatal jaundice

Table III shows comparison of frequency of prescription for neonatal jaundice among 141 Primary and 68 secondary health workers. Common pharmacological agents prescribed were Ampiclox (Ampicillin-Claxacillin formulation), Glucose water, Multivitamins, phenobarbitone, other antibiotics and injections. Others were solution extracts made from pawpaw leaves and/or seed in water, exposure to early sunlight, native herbal preparations and solution of naphthalene balls in water. Significantly higher proportions of primary health care workers prescribed non-pharmacologic medications more for babies with jaundice.

Knowledge of dangers (Complications) of severe jaundice

Table IV shows comparison of knowledge of dangers (Complications) of severe jaundice among the primary and secondary health care workers. The secondary health care workers were better informed about severe jaundice causing visual, auditory, speech/ language handicapping, cerebral palsy and even death.

Table 4: Comparison of knowledge of dangers (Complications) of severe jaundice among 141 Primary and 68 Secondary Health Care Birth Attendants.

Variable	Primary health care birth attendants n=141			Secondary health care midwives n=68			p-value
	Yes n (%)	No n (%)	I don't know n (%)	Yes n (%)	No n (%)	I don't know n (%)	
Poor vision	28 (19.9)	31 (22.0)	82 (58.1)	42 (61.8)	12 (17.6)	14 (20.6)	0.000
Poor hearing and deafness	23 (16.3)	27 (19.1)	91 (64.5)	48 (70.6)	10 (14.7)	10 (14.7)	0.000
Poor speech and language development	25 (17.7)	32 (22.7)	84 (59.6)	41 (60.3)	07 (10.3)	20 (29.4)	0.000
Poor development like delayed sitting, crawling, standing, walking	28 (19.9)	49 (34.8)	64 (45.4)	48 (70.6)	09 (13.2)	11 (16.2)	0.000
Convulsion/Epilepsy	27 (19.1)	53 (37.6)	61 (43.3)	37 (54.4)	12 (17.6)	19 (27.9)	0.000
Brain damage	23 (16.3)	44 (31.2)	74 (52.5)	33 (48.5)	14 (20.6)	21 (30.9)	0.000
Poorly growth and stained teeth	15 (10.6)	39 (27.7)	87 (61.7)	35 (51.5)	11 (16.2)	22 (32.4)	0.000
Death	13 (9.2)	29 (20.6)	99 (70.2)	39 (57.4)	17 (25.0)	12 (17.6)	0.000

DISCUSSION

The present study shows that primary health care workers in the range of 9.2 to 52.5% had good knowledge on various parameters tested while it was 50.0 to 94.1% among workers in the secondary health facilities. Conversely, 49.6% to 90.8% did not have adequate knowledge among the primary health workers and 5.9 to 50.0% among the secondary health workers had inadequate knowledge in diverse parameters tested. It shows therefore, that though many of the health workers at both primary and secondary health care facilities had good knowledge about neonatal jaundice causes, treatment, complications and counseling of mothers yet there are still many areas of paucity of knowledge on the causes and effects of jaundice in the newborn. Olusoga et al in Sagamu³ and Ekanem et al in Calabar⁴ also had similar observations of weak understanding of neonatal jaundice in terms of definitions, knowledge of causes, treatment and possible complications of severe jaundice among the health workers at primary health care levels.

It was also postulated that the wrong information may have percolated to the mothers to explain why many mothers gave similar responses to same questions and similar unorthodox practices in the management of neonatal jaundice. Adebami in Ilesa,⁵ Su Yuen Ng et al,⁶ Boo et al⁷ in Malaysia, Khalesi et al in Iran,⁸ Egule et al in Benin,⁹ Olusoga et al³ and Ogunlesi et al¹⁰ in Sagamu had all observed at various degree of lack of attention, self-treatment, use of inappropriate medicine, use of medicinal herbs and traditional remedies as treatment for neonatal jaundice among mothers or expectant mothers in their respective regions.

Ignorance of health workers based on the causes, care/treatment and complications of severe neonatal jaundice will have very serious consequences on the management of neonatal jaundice and can pose serious challenge on the reduction of bilirubin induced neurologic dysfunction in the community.

It is of note that many health workers do not know about Glucose 6 phosphate dehydrogenase (G6PD) deficiency

which is regarded as the most important cause of severe jaundice and bilirubin encephalopathy in Nigeria.¹¹ In the present study, 9.2% and 50.0% of primary health care and secondary health care workers were aware of G6PD deficiency respectively. This is higher than 3.4% observed by Ekanem et al among 205 primary health care staff in Calabar.⁴ Olusoga et al³ did not include the knowledge of G6PD in the survey among the community health workers in Sagamu; because they thought it will be too technical. Glucose-6-phosphate dehydrogenase (G-6-PD) deficiency is the most common disease producing enzymopathy in humans. G6PD catalyzes the entry step of G6P into the Pentose Phosphate Shunt (PPS) in the red cells. While many other body cells have other mechanisms of generating NADPH, the red blood cells rely completely on G-6PD activity because it is the only source of NADPH that protects the cell against oxidative stress and injury.¹² Deficiency of this enzyme which occurs in an X-linked recessive inheritance mode (therefore commoner in males) predisposes the individual to severe haemolysis, jaundice and anaemia when exposed to infections, certain foods and some medications. Prevalence of G6PD deficiency vary from 20.6% in Ibadan¹³ to 37.3% in Ilorin.¹⁴ Ignorance of this important cause is reflected in the continuous use of iatrogenic and highly provocative agents like naphthalene balls on babies, more so, in the treatment of jaundice. Many of the local herbal preparations contain menthol which is contraindicated in G6PD deficient individuals.

Also, the act of prescribing oral antibiotics for treatment of jaundice is a reflection of ignorance on the seriousness of neonatal sepsis as a cause of jaundice. In the present study, more than 80% and 70% of primary and secondary health workers respectively favoured the use oral antibiotics as part of the management for neonatal jaundice. This is higher than Olusoga et al finding of 54.5% in Sagamu³ and Ekanem et al of 70.7% in Calabar.⁴ Though prevalence of neonatal sepsis is high in the developing countries because many deliveries are unsupervised and occur in unhygienic environment. However, treatment of sepsis in the newborn should be intensive when sepsis is perceived to be the cause of the jaundice. Newborn babies especially the preterm are physiologically immunocompromised.¹⁵ Sepsis in newborn result in poor sucking, dehydration, release of hemolysis with resultant hemolysis, increased blood brain barrier permeability for unconjugated bilirubin, thereby increasing the probability of bilirubin encephalopathy development. Therefore, sepsis, in newborn is managed with parenteral antibiotics. Use of oral antibiotics usually result in ineffective treatment of babies with sepsis, late presentation or may precipitate development of antibiotic resistance to commonly used and cheaper antibiotics.

Significantly higher proportions of health care workers at the primary health care level in the present study were ignorant of predisposition of low birth weight and preterm to severe jaundice. It is known that about 80% of preterm may be jaundiced as a result of higher rate of

hemolysis, inadequate conjugation, low levels of binding proteins (albumin, Y and Z proteins), low levels of enzymatic activities, inadequate intake with increased entero-hepatic circulations and poor blood brain barrier.¹⁶⁻¹⁸ Preterms are therefore more susceptible to the development of bilirubin encephalopathy and those who are jaundiced among them should be referred early.¹⁷⁻¹⁹

The knowledge of phototherapy and /or exchanged blood transfusion is quite low among the primary health workers in the present study where 24.1% and 16.3% of respondents had knowledge of phototherapy and exchanged blood transfusion respectively; hence the use of non-conventional method of treatment for neonatal jaundice. Finding of present study is however lower than 39.5% in Calabar⁴ and 54.5% in Sagamu.³ The present study also reported 82.4% and 61.8% for phototherapy and exchanged blood transfusion respectively among the nurses /midwives at the secondary health facilities. Use of sunlight phototherapy is popular among the respondents of both health facilities similar to other previous studies.^{3,4} For moderate to severe jaundice, phototherapy with electric generated blue-light or light-emitting diode (LED) devices is the treatment of choice, failing which exchange transfusion becomes necessary to avert bilirubin-induced neurologic dysfunction.²⁰⁻²² In many resource-limited settings, there is no phototherapy at all in the primary health care centers and sparsely used in the most secondary health facilities. The use of effective phototherapy for jaundiced infants is frequently hampered by non-availability of conventional phototherapy devices powered by electricity.²³⁻²⁵ Several studies especially in the tropics have reported a common practice of exposing jaundiced infants to direct sunlight as a form of treatment despite concerns about the potential dangers from infrared and ultraviolet rays and sunburn.^{9,23} Exposure of newborns to direct and unfiltered sunlight should be discouraged because of the potential and invisible harms from ultraviolet radiation and infrared rays.²⁰

The prevalence of 'physiological jaundice' which needs no treatment and therefore responds to any "treatment" and give a fictitious confidence to many health workers and has been attributed to the underestimation of irreversible brain damage that could occur in bad management of severe jaundice.² Moreso, many of the health workers are unaware of the deleterious effects severe jaundice can cause on the immature brain of a newborn. In the present study, less than 20% of the primary health workers are aware of the sequelae of severe neonatal jaundice. This is lower than 49.3% at a primary health post in Calabar⁷ and 67% among the mothers attending antenatal care clinic in Benin.⁹

There is therefore urgent need to train health workers of all cadres on causes, care, effective treatment and complications of neonatal jaundice to reduce the high prevalence of bilirubin encephalopathy being reported in the developing countries. Teaching health institutions

should ensure good exposure of potential health workers in training (students) to adequate knowledge, skill, experience to manage common neonatal conditions which jaundice is very significant. Facilities like effective phototherapy units should be made available at health facilities. Also to reduce knowledge gap specialists like Paediatricians should be involved in the training of health workers of both primary and secondary health facilities.

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