

Neonatal jaundice and its management: Knowledge, attitude, and practice among expectant mothers attending antenatal clinic at University of Benin Teaching Hospital, Benin City, Nigeria

BA Egube, AN Ofili, AR Isara, JU Onakewhor¹

Departments of Community Health and ¹Obstetrics and Gynaecology, University of Benin Teaching Hospital, Benin City, Nigeria

Abstract

Introduction: Neonatal Jaundice (NNJ) is a common disorder worldwide and one of the important contributors to the high neonatal morbidity and mortality in Sub-Saharan Africa. Severe neonatal jaundice leads to brain damage or even death in otherwise healthy newborns. The objective of the study was to assess the knowledge, attitude and practice of expectant mothers about neonatal jaundice and its management.

Materials and Methods: The study was descriptive cross-sectional, carried out among 389 expectant mothers who were attending the antenatal clinic at the University of Benin Teaching Hospital. A structured, Pre-tested, researcher administered questionnaire was used to interview the respondents. Data was analysed using SPSS version 15.

Results: The mean age of the expectant mothers was 30.5 (SD 4.9) years. Fifty-five (14.1%) of respondents had previous experience with NNJ, 8 (2.1%) lost babies due to NNJ. 334 (85.9%) were aware of the condition, 381 (77.4%) knew how to recognize the symptoms of NNJ, 279 (71.7%) knew a correct method of treatment of NNJ. A large proportion of the expectant mothers 261 (67%) knew some complications of NNJ. Two hundred and five (52.7%) did not know any danger sign of complications of NNJ. Three hundred and fifty five (91.3%) had good attitude towards its management. Majority of expectant mothers whose previous babies had NNJ took the babies to the hospital for treatment. A large proportion also expressed their willingness to seek medical attention if their babies were to develop the condition. Their knowledge of neonatal jaundice was significantly influenced by their level of education and the number of their previous babies who had NNJ.

Conclusion: This study revealed that expectant mothers attending antenatal clinic at UBTH had good knowledge of the treatment and complications of NNJ but inadequate knowledge of the causes and danger signs of the condition. Their attitude and practice towards the management of NNJ was good. It is therefore recommended that Health care providers should give more health education on NNJ to the expectant mothers during antenatal visits.

Key words: Neonatal jaundice, expectant mothers, antenatal clinic, Benin City

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Introduction

Neonatal jaundice refers to the yellowish discoloration of the skin and sclera of a newborn by bilirubin.^[1-3] It occurs in about 50-60% of full term newborn babies and 80%

of preterm newborn babies.^[1-3] It is a common disorder worldwide and accounts for 75% of hospital re-admissions

Address for correspondence:

Dr. Beatrice A. Egube,
Department of Community Health, University of Benin Teaching
Hospital, P.M.B. 1111, Benin City, Nigeria.
E-mail: bettyegube@yahoo.com

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in the first week of life.^[3,4] Neonatal jaundice is one of the important contributors to neonatal morbidity and mortality which has remained very high in Sub-Saharan Africa, Asia, and Latin America.^[5,6] The jaundice is usually due to unconjugated hyperbilirubinemia, which is neurotoxic and can cause kernicterus or even death in newborns.^[7]

Kernicterus is characterized by bilirubin staining of the basal ganglia and involves diffuse neuronal damage.^[7] The precise blood level above which unconjugated bilirubin will be toxic for an individual infant is unpredictable.^[3,5] However, high incidence of kernicterus is associated with serum bilirubin levels in excess of 20 mg/dl in normal birth weight babies who are otherwise healthy.^[7] There is no cure for kernicterus, but it is preventable if jaundice is recognized early and effective therapy commenced promptly.^[7] Physiologic jaundice becomes visible on the second to third day, usually peaking between the second and fourth days at 5 to 6 mg/dl, and decreasing to below 2 mg/dl between the fifth and seventh days of life.^[2] In most infants, yellow color is the only finding on physical examination.^[2] Risk factors for significant hyperbilirubinemia have been reported to include cephalhematoma, positive Coombs test, ABO blood incompatibility, Rhesus iso-immunization, and glucose-6-phosphate dehydrogenase deficiency (G6PD deficiency).^[2,4] Others include delivery by vacuum extraction, breast feeding, maternal diabetes, oriental race, short gestation, male sex, and induction of labor with oxytocin.^[2,4]

A study carried out in Nigeria among 189 expectant mothers attending the antenatal clinic of a tertiary care facility in 2005, revealed that the mothers' knowledge about the main causes of NNJ was grossly deficient.^[3] About 43.4% of the respondents did not know how to check a baby for neonatal jaundice (NNJ) correctly, while 49.7% did not know any danger sign of NNJ and 14.8% wrongly believed in the use of local remedy such as water extract of unripe paw-paw for the treatment of the condition.^[3]

Kernicterus, though preventable by currently available techniques, appears to be increasing internationally.^[8,9] Although the total number of affected newborn has been small, relative to the total number of live births, the magnitude of the devastation in newborns who were not thought to be at risk has prompted a reassessment of the clinical problem of neonatal hyperbilirubinemia.^[10] In breastfeeding mothers, breast milk supply may be suboptimal in the first few days, exposing the infants to inadequate fluids and nutrition thus leading to a higher incidence of NNJ.^[10] Increasing number of newborn are being discharged from hospital within 48 hours after birth and with short post-natal hospital stay, jaundice may not be apparent at the time of hospital discharge.^[4] Clinical experience has shown that many babies arrive late in hospitals with kernicterus.^[3] "Whether or not this delay in seeking medical consultation is due to lack of awareness or inadequate knowledge is not certain."^[3]

Early intervention plays a key role in the prevention of the adverse outcomes resulting from neonatal hyperbilirubinemia.^[4,7] Early post-natal discharge from the hospital requires that parents should be able to recognize NNJ and seek prompt medical attention for it. This study was therefore designed to assess the knowledge, attitude and practice of expectant mothers with regard to NNJ and its management with the view of providing background data as basis for planning necessary health education intervention.

Materials and Methods

This descriptive cross-sectional study was carried out at the ante-natal clinic of University of Benin Teaching Hospital (UBTH), which is a tertiary health care facility situated in Benin City (the capital of Edo State) in the South-South geo-political zone of Nigeria. The study population consisted of expectant mothers attending the ante-natal clinic at UBTH. The antenatal clinics were held on Mondays, Tuesdays, Thursdays, and Fridays with the patients registered under the 12 consultants in the Department of Obstetrics and Gynaecology. These consultants were divided into four Units consisting of three consultants each.

Ethical clearance was obtained from Ethics and Research Committee of UBTH before commencement of the study, while permission to conduct the study was obtained from the Head of Department of Obstetrics and Gynecology. Individual Informed consent was obtained verbally from the respondents after the purpose of the survey was explained to them and confidentiality was assured.

The minimum sample size required for the study calculated using the formula for sample size determination for an infinite population in a descriptive study,^[11] and a prevalence of 56.6% obtained from a previous study³ was 377. A simple random sampling technique using the table of random numbers was used to select patients from a list of those registered in each of the Units on each clinic day. An average of 25 patients was recruited for the study on each clinic over a period of 4 weeks. To ensure that a respondent was not recruited into the study more than once as the study progressed, respondents were asked if they had been interviewed previously and only those who had not been interviewed previously participated in the study.

Data were collected using a structured, pretested, researcher administered questionnaire. Qualitative information was sought on socio-demographic characteristics of the expectant mothers and also their knowledge, attitude and practice with regards to NNJ and its management. At the end of the entire data collection period of the research, a health education talk was given by the researchers to all the expectant mothers. This was followed by questions and answer section where adequate clarification was made on issues of NNJ.

Data collected were cross-checked for completeness before they were entered into the computer, and analyzed using Statistical Package for Social Science (SPSS) version 15. Five questions were used to assess the past obstetric history of the respondents. The number of times the respondents had been pregnant including the present pregnancy were assessed as: Primigravida (one pregnancy), Multigravida (Two to four pregnancies), and Grand multigravida (Five and more pregnancies). The number of times the respondents had delivered babies was assessed as: Nulliparous (No delivery), Primiparous (One delivery), Multiparous (Two to four deliveries), and Grand multiparous (Five and more deliveries). Twenty-four questions were used to assess respondents' knowledge while their attitude was assessed with five questions. Their practice with regards to the management of NNJ was assessed using two questions. Respondents' answers to questions on knowledge of NNJ were graded as correct and incorrect and the total score of the correct answers were used to categorize respondents as follows: Poor Knowledge (0–11 questions answered correctly), Good Knowledge (12–17 questions answered correctly), and Very good Knowledge (18–24 questions answered correctly). The five questions used to assess respondents' attitude to management of NNJ were assigned scores according to each item, thus the attitude was graded as Poor attitude (0 – 2) and Good attitude (3 – 5). Chi-square statistical test and Fisher's exact test were used to test association between the socio-demographic characteristics of the respondents and their knowledge and attitude towards NNJ. The level of significance was set at $P < 0.05$ and confidence level at 95%.

Results

A total of 389 expectant mothers who were attending antenatal clinic at UBTH were interviewed. The socio-demographic characteristics of the respondents are shown in Table 1. The mean age of the respondents was 30.5

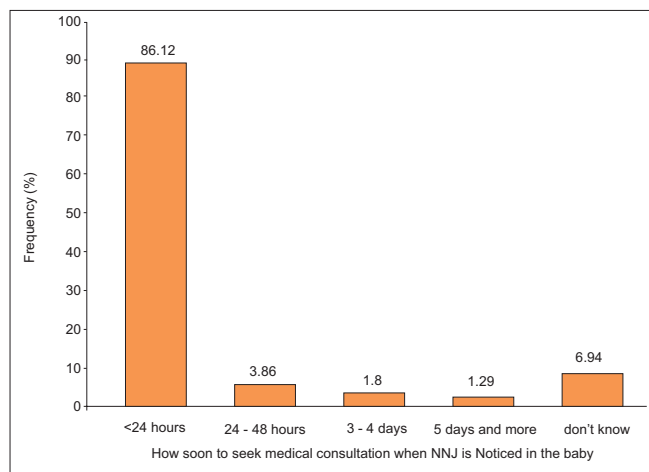


Figure 1: Respondents' attitude to seeking medical consultation for NNJ

(SD 4.9) years. A majority of them, 276 (71.0%), were in the age group of 26–35 years, while only 2 (0.5%) were in the age group of 46–55 years. Fifty-six (14.4%) of them were in the 16–25 age group. Most of the respondents, 236 (60.7%), had tertiary education, while 128 (32.9%) had secondary education, and 25 (6.4%) had only primary education. One hundred and forty-five (37.3%) of the respondents were nulliparous, while 126 (32.4%) were multiparous, 113 (29.0%) were primiparous and only 5 (1.3%) were grand multiparous.

Table 1: Socio-demographic characteristics of respondents

Variable	Frequency (n=389)	Percent
Age group in years		
16-25	56	14.4
26-35	276	71.0
36-45	55	14.1
46-55	2	0.5
Mean age in years 30.5 (SD 4.9) years		
Level of education		
Primary	25	6.4
Secondary	128	32.9
Tertiary	236	60.7
Parity		
Nulliparous	145	37.3
Primiparous	113	29.0
Multiparous	126	32.4
Grand multiparous	5	1.3

Table 2: Respondents' knowledge of causes of neonatal jaundice

Causes	Frequency (N=389)	Percent
Disparity between blood group of mother and baby	72	18.5
Prematurity	63	16.2
Infection	156	40.1
Breast milk	17	4.4
Drugs	3	0.8
Cold water	16	4.1
Others	2	0.6
Don't know	177	45.5

*Multiple responses; *Others include Intestinal Obstruction and maternal Diabetes Mellitus

Table 3: Respondents' knowledge of the complications of neonatal jaundice

Complications	Frequency (N=389)	Percent
Death of the baby	225	57.8
Brain damage	103	26.5
Mental retardation	70	18.0
Physical handicap	55	14.1
Convulsions later in life	41	10.5
Don't know	128	33.0
Blindness	1	2.6

Awareness of NNJ was affirmed by 334 (85.9%) of the respondents, while 55 (14.1%) had never heard of NNJ. One hundred and three (33.4%) had their source of information from the hospital, 105 (27.0%) of them heard from friends, 59 (15.2%) heard from relations, 8 (2.1%) of them heard via mass media, while 24 (6.2%) of the respondents heard at school, 5 (1.3%) had their source from books, and finally, 3 (0.8%) heard from church. Three hundred and eighty-one (77.4%) respondents knew how to recognize NNJ, while eight (2.6%) of them did not know how to recognize NNJ. Seventy-two (18.5%) respondents knew that disparity between the mother's blood group and that of the baby could be a cause of NNJ [Table 2]. One hundred and six (27.2%) knew that Sepsis could be a cause of NNJ, while 63 (16.2%) knew that prematurity could be a cause of NNJ. Sixteen (4.1%) respondents erroneously believed that drinking of cold water during pregnancy could be a cause of NNJ. Others, 5 (1.3%) of the respondents added that drugs, hemolysis, intestinal obstruction, and maternal diabetes could be causes of NNJ. A high proportion, 177 (45.5%), of the respondents did not know any cause of NNJ. Most (60.4%) of the respondents knew that NNJ could be treated by exposure of the baby to sunlight, while 157 (40.4%) knew that phototherapy was a form of treatment for NNJ, and 102 (26.2%) knew that exchange blood transfusion was a form of treatment for NNJ. One hundred and ten (28.3%) of the respondents did not know any correct treatment of NNJ. Of these, 3 (0.8%) believed that extract of paw-paw is a treatment for NNJ and 6 (1.5%) believed that glucose drink is used for treatment of NNJ.

A majority, 225 (57.8%), of the respondents knew that neonatal death was a complication of NNJ, while 103 (26.5%) knew that brain damage was a complication of NNJ [Table 3]. One hundred and twenty-eight (33%) did not know any complication of NNJ. Two hundred and five (52.7%) did not know any sign of danger of complication of NNJ [Table 4]. One hundred and thirty-eight (35.5%) knew that refusal of food was a complication of NNJ. Eighty-eight (22.6%) knew that arching of the back was a sign of danger of complication of NNJ. Most of the respondents, 335 (86.1%), were of the opinion that a baby with NNJ should be taken to hospital for treatment immediately the jaundice is noticed, while 15 (3.9%) said that the jaundiced child should be taken to the hospital within 24–48 hours [Figure 1].

A large proportion of the expectant mothers, 374 (96.1%), agreed that they would accept phototherapy for treatment of NNJ, if their babies had the condition. But 15 (3.9%) would reject phototherapy. Out of these, 5 (33.5%) gave their reason for rejecting phototherapy, that it could make the baby blind. Also, 324 (83.3%) of the respondents agreed that they would accept exchange blood transfusion (EBT) for treatment of NNJ if their babies had the condition, while 65 (16.7%) would reject it. Of these,

30 (46.2%) gave their reason for rejecting EBT, that infections such as HIV/AIDS could be transmitted via the procedure, and 9 (13.8%) would reject it based on their religion.

Table 4: Respondents' knowledge of the signs of danger of complications of NNJ

Signs of danger	Frequency (N=386)	% Frequency
Refusal of food	138	35.5
High pitched cry	113	29.0
Arching of the back	88	22.6
Convulsions	116	29.8
Down turning of the eyes	90	2.3
Don't know	205	52.7

Table 5: Respondents previous experience with neonatal jaundice

Variable	Frequency (N=389)	Percent
Have had a child who had neonatal jaundice		
None	334	85.9
One	49	12.6
Two	4	1.0
Three	2	0.5
Have had a child who died from neonatal jaundice		
Yes	8	2.1
No	381	97.9
How neonatal jaundice was treated		
Baby treated in the hospital	43	11.0
Baby treated in traditional	3	0.7
Healing home		
Baby exposed to sunlight at home	7	1.8
Nothing was done	1	0.3
Glucose drink was given at home	1	0.3

Table 6: Socio-demographic characteristics of respondents and their knowledge of neonatal jaundice

Variable	Knowledge of neonatal jaundice			
	Poor freq. (%)	Good freq. (%)	Fishers exact	P value
Age (years)				
16-25	54 (96.4)	2 (3.6)	6.540	0.074
26-35	248 (89.9)	28 (10.1)		
36-45	45 (81.9)	10 (18.1)		
46-55	2 (100)	0 (0.0)		
Level of education				
Primary	25 (100)	0 (0.0)	11.601	0.020
Secondary	122 (95)	6 (5.0)		
Tertiary	202 (85.6)	34 (14.4)		
Number of previous babies who had neonatal jaundice				
None	307 (91.9)	27 (8.1)	19.112	0.0001
One	40 (81.6)	9 (18.4)		
Two	2 (50.0)	2 (50)		
Three	0 (0.0)	2 (100)		

Table 7: Socio-demographic characteristics of respondents and their attitude regarding neonatal jaundice and its management

	Attitude regarding management of neonatal jaundice		X ²	Fishers exact	P value
	Poor freq. (%)	Good freq. (%)			
Age (years)					
16-25	4 (7.1)	52 (92.9)		0.557	0.934
26-35	25 (9.1)	251 (90.9)			
36-45	5 (9.1)	50 (90.9)			
46-55	0 (0.0)	2 (100)			
Level of education					
Primary	1 (4.0)	24 (96.0)	1.047		0.593
Secondary	13 (10.2)	115 (89.8)			
Tertiary	20 (8.5)	216 (91.5)			
Number of previous babies who had neonatal jaundice					
None	29 (8.7)	305 (91.3)		0.694	0.877
One	5 (10.2)	44 (89.8)			
Two	0 (0.0)	4 (100)			
Three	0 (0.0)	2 (100)			

If their babies had jaundice, 378 (97.2%) of the expectant mothers would treat their babies in the hospital, while 9 (2.3%) would expose their babies to sunlight at home. A majority, 355, (91.3%) of the respondents had good attitude toward management of NNJ. A large proportion, 355 (91.3%), of the respondents expressed their willingness to seek medical attention if their babies were to develop NNJ.

A higher proportion of the respondents, 334 (85.9%), had no previous experience of NNJ in any of their babies, while 55 (14.1%) of them had experience of NNJ in their previous babies, and out of these, 8 (2.1%) lost babies due to NNJ. The numbers of respondents' previous babies who had NNJ are shown in Table 5. Forty-nine (12.6%) of the respondents had previous experience of NNJ with one baby, 4 (1.0%) had previous experience of NNJ with two babies, while only 2 (0.5%) had the experience with three babies. Out of the 55 (14.1%) who had previous experience with NNJ, 43 (11.0%) treated their babies in the hospital, 3 (0.7%) treated their babies in the traditional healing home, while 7 (1.8%) exposed their babies to sunlight at home. One (0.3%) treated the baby on her own with glucose drink, while 1 (0.3%) did nothing.

A cross-tabulation of the socio-demographic characteristics of respondents and their knowledge of NNJ [Table 6] showed that there was a statistically significant association between the level of education ($P = 0.020$), the number of respondents' previous babies who had experienced NNJ ($P = 0.0001$), and their knowledge of NNJ. Respondents'

knowledge of NNJ increased with increasing level of education and the number of their previous babies who had experienced NNJ. There was no statistically significant association between the age ($P = 0.074$), the parity of the respondents ($P = 0.070$), and their knowledge of NNJ. As shown in Table 7, there was no statistically significant association between respondents' level of education ($P = 0.593$), the number of respondents previous babies who had experienced NNJ ($P = 0.877$) and respondents attitude toward the management of NNJ.

Discussion

The high literacy level observed in the study is in keeping with the fact that Benin City being a state capital, is made up of highly enlightened people. This was similar to that observed in a study at a tertiary institution in South-Western Nigeria.^[3] A high level of awareness about NNJ was shown in this study, which was in keeping with reports from similar studies in South Western Nigeria, Port Harcourt, and Malaysia with 189 (100%) of the respondents, 225 (88.2%) of the mothers, and (93.8%) of the 400 respondents, respectively being aware of NNJ.^[3,12,13] A majority of the respondents who affirmed awareness of NNJ had their source of information from hospital workers, while very few had theirs from the mass media, school, or books. This was similar to the findings in the study done in South Western Nigeria and in Port Harcourt, where a large proportion of the mothers had their source of information from health workers.^[3,12] It was important to note that a small proportion of the mothers had their source of information from the mass media, school, or from books. Health talks in the antenatal clinics alone will not be sufficient to reach the mothers in the community because only about 58% of pregnant women in Nigeria receive antenatal care from skilled providers while only 35% of women in Nigeria give birth in health facilities.^[14] Some studies have reported that many of the cases of severe NNJ admitted into the hospital were babies who were born outside these hospitals.^[15,16] In the study by Owa and Ogunlesi in Nigeria, it was revealed that a greater proportion of babies who had exchange blood transfusion for NNJ were out-born 76 (84.4%), while the in-born babies were 14 (15.6%).^[15] Of the 27 (30.0%) babies who developed features of kernicterus (26 before admission while 1 during admission), all except one were delivered outside the hospital.^[15] The study in Abakaliki in South Eastern Nigeria also showed that significant bilirubinemia occurred significantly more in out-born babies 66 (63%) than in in-born babies 40 (48.2%).^[16]

The knowledge of the mothers was adequate in the aspect of awareness, recognition, treatment, and complications of NNJ. This finding was contrary to that found in the study in Port Harcourt where the mothers had the misconception that eating too much groundnut during pregnancy, and

mosquito bites were the main causes of NNJ.^[12] In addition, some of the mothers wrongly believed that exposure to sunlight and use of glucose water were the main forms of treatment of the condition.^[12] There was also the misconception that water extract from paw-paw was used as treatment of NNJ.^[3]

However, the knowledge of the expectant mothers on causes, and the danger signs of complications of NNJ were inadequate. This was in keeping with the report from a study in Iran where the knowledge of the mothers was insufficient about the causes, complication, harmful symptoms, and prevention of the condition.^[17] Inadequate knowledge about the causes, treatment, complications, and danger signs of NNJ coupled with various misconceptions about the condition may adversely affect the actions of the mothers in the prevention of some of the causes of NNJ such as neonatal sepsis as may occur from poor umbilical cord hygiene and hemolysis as may occur in G6PD-deficient babies when menthol is applied to the umbilical cord. Secondly, it may also result in a delay in seeking medical attention for NNJ hence contributing to development of kernicterus. It was shown in this study that the level of education of the respondents, and also the number of their previous babies who had NNJ, had a significant influence on their knowledge of the condition. But there was no significant association between the age of the mothers and their knowledge of NNJ. In a similar study in Iran, it was observed that the knowledge was significantly associated with history of NNJ, child's birth rank, and the mother's age.^[17]

This study revealed that the mothers had a positive attitude toward NNJ and its management. Although the women in the study agreed that a newborn with jaundice should be taken to the hospital within 24 hours of development of the condition, studies have shown that most babies present late in the hospitals after complications have set in.^[15,18] In the study carried out in Ebonyi State University Teaching Hospital, Abakaliki, there was on the average 48 hour delay between onset of NNJ and hospital presentation.^[18] In the study by Owa and Ogunlesi, of the 27 newborn who developed kernicterus, 26 of them had developed the condition before admission to the hospital.^[15] Similarly, in another Nigerian study, out of the 75 newborn who had acute bilirubin encephalopathy, 73 of them had developed the condition before presentation at the hospital.^[19] It has been shown that exposures of bilirubin levels higher than 20 mg/dl even for less than 6 hours, between 6 and 12 hours and more than 12 hours result in neurological disorders in 2.3%, 18.7%, and 26% of cases, respectively.^[20]

A majority of the mothers in this study would agree to phototherapy, and exchange blood transfusion for the management of NNJ. A study in Iran reported that 64.3% of the mothers agreed to exchange blood transfusion, while

only 25% agreed to phototherapy for management of NNJ.^[17] Some studies have revealed that there is a high rate of use of exchange blood transfusion for management of severe hyperbilirubinemia in Nigeria contrary to the management of the same condition in developed countries where fibre-optic phototherapy blankets, metalloporphyrins, and casein containing infant formulae are used.^[15,18] Exchange blood transfusion was also revealed to have significant morbidity and mortality such as fever, gut perforation, respiratory arrest, and death following the procedure.^[18] Exchange blood transfusion could be avoided in the management of NNJ if the babies with NNJ are presented early at the hospitals and prompt and effective phototherapy is commenced. Irregular power supply and lack of effective phototherapy also contribute to the higher rate of exchange blood transfusion in Nigeria.^[15,18] A study done to evaluate the phototherapy units at 12 nurseries in Nigeria revealed that none of the phototherapy units delivered intensive phototherapy (irradiance >30 uw/cm²/nm) and only 6% of the machines provided irradiance of >10 uw/cm²/nm.^[21] The distance between the infant and the phototherapy ranged between 45 and 60 cm, instead of the recommended distance of about 10 cm.^[21]

In this study, a majority of the expectant mothers expressed their willingness to seek medical attention if their babies were to develop NNJ and a large proportion of the respondents, whose previous babies had experienced NNJ, had taken the jaundiced babies to the hospital for treatment. Nevertheless, 8 out of the 55 babies affected died. It could not be verified in this study whether the babies who died were brought to the hospitals early or late after complications had set in. In a similar study in Iran, 33.3% of the mothers consulted a physician within 24 hours of appearance of jaundice, while 13.8% of the mothers declared that they waited and managed their children with traditional medicines until they sought medical advice.^[22] The study in South Western Nigeria showed that only 10 (5.3%) respondents had previous experience with NNJ.^[3] Of these, five (50%) managed the condition with drugs on their own at home, while the remaining five (50%) did not give any treatment.^[3] Early referral at the primary health care would also contribute to the reduction of the burden of severe NNJ. It was reported in a Nigerian study among health workers that 13.4%, 10.4%, and 3% of the participants would treat NNJ with ineffective drugs, natural phototherapy and herbal remedies, respectively.^[1]

In conclusion, this study revealed that the expectant mothers attending antenatal clinic at UBTH, Benin City, had a high level of awareness and recognition of symptoms of NNJ. Their knowledge of the treatment and complications of the condition was also good. However, their knowledge of the causes and danger signs of complications of NNJ was inadequate. The expectant mothers had good attitude toward the management of the condition. A majority of

them whose previous babies had NNJ took their babies to the hospital for treatment. A large proportion also expressed their willingness to seek medical attention if their babies were to develop the condition. It is therefore recommended that Health care providers should continuously educate the expectant mothers during ANC, on NNJ with special focus on the causes and danger signs of complications of NNJ. The sustenance of the high awareness of NNJ among expectant mothers could be done using the mass media, Community Health Officers and Community Health Extension Workers at the Primary Health Care levels, and Traditional Birth Attendants for those who do not seek care in the health facility. The positive attitude and practice could be enhanced by involving the males, grandmothers, and the community in health education on NNJ.

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