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Neonatal Jaundice at Wesley Guild Hospital, Ilesa and Ife State Hospital, Ile-Ife

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SUMMARY

Owa J A, Taiwo O, Adebiyi J A O and Dogunro S A. Neonatal Jaundice at Wesley Guild Hospital, Ilesa and Ife State Hospital, Ile-Ife. Nigerian Journal of Paediatrics 1989; 15: 0. Analysis of 273 cases of severe neonatal jaundice (NNJ) seen at the Wesley Guild Hospital, Ilesa and the Ife State Hospital, Ile-Ife, over an eight-month period, has shown that even though the overall pattern of disease was similar in the two centres, differences were found between the inpatients and out patients in both centres. The mean age at which jaundice was observed was significantly higher and jaundice was more severe among the out patient cases as judged by the need for exchange blood transfusion and the number with kernicterus. The major associated aetiological factors were Glucose-6-phosphate dehydrogenase deficiency in 45.8%, ABO incompatibility in 27.5%, low birthweight in 24.2% and septicaemia in 20.5%. In 24.2% of cases, no aetiological factor was identified, while in 25% multiple factors were associated. Glucose-6-phosphate dehydrogenase deficiency was significantly more common in the outpatient than inpatient cases and about 80% of the outpatients had been exposed to potentially toxic agents. Efforts at reducing morbidity and mortality in severe NNJ should therefore be directed mainly, at the outpatient cases.

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Introduction

SEVERE neonatal jaundice (NNJ) with resultant kernicterus is still a common problem in Nigeria.[1] This is particularly so in babies born at home or discharged home early from the hospitals.[2—5] . In most instances Glucose-6-phosphate dehydrogenase (G-6-PD) deficiency is an associated factor.[1 5 6] Recent reports suggest that severe jaundice in the G-6-PD defi-

cient infant is preventable.[1 6 7] Neonatal jaundice is a common indication for admission into our Neonatal Wards at Wesley Guild Hospital (WGH), Ilesa and Ife State Hospital (ISH), Ile-Ife. However, no previous study has been carried out in these hospitals. This present prospective study was thus, undertaken to provide the relevant information about aspects of NNJ as seen in the two hospitals making up Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC).

Patients and Methods

All babies delivered at WGH, Ilesa and ISH, Ile-Ife (inborns) between May and December 1985 were examined daily for evidence of jaundice until they were discharged. Mothers were also shown how to check for jaundice in their babies. Babies who developed jaundice while still in hospital after delivery were considered to be inpatient jaundice babies. A record was also kept of all jaundiced neonates who were not delivered at WGH or ISH but who presented at the two centres during the period of study. These outborn babies consisted of jaundiced babies referred to the two centres for treatment and babies found to be jaundiced on routine examination at the Infant Welfare Clinic (IWC) following delivery at home, churches or other maternity centres. A few of the babies delivered in the two centres who were discharged home early, became jaundiced later and were brought to the IWC from where they were admitted for treatment. Such babies were added to the outborn jaundiced babies to make up the outpatient group.

Serum bilirubin (SBR) was performed on the inborn babies on detection of jaundice and on those admitted from outside at the time of admission and subsequently monitored as indicated. Those babies with maximum SBR of 12mg/dl or above, constituted the subjects of the present study. Serum bilirubin of 12mg/dl was chosen as indicative of severe neonatal hyperbilirubinaemia in accordance with accepted practice.[9 10]

The clinical history recorded on each baby included age at onset or detection of jaundice, previous history of jaundice in siblings, and direct or indirect exposure to potentially icterogenic agents. Other information recorded included the gestational age and birthweight. Each baby had a comprehensive physical examination and features of kernicterus and septicaemia were specifically sought for.

Initial investigations routinely carried out on each baby included full blood count (FBC), blood group (baby and mother), Coomb's test, and G-6-PD screening using either the Methaemoglobin Reduction Test or the Fluorescent Screening Method. The two G-6-PD screening methods have been shown to give similar results.[11] Blood cultures were done whenever possible in the babies with suspected septicaemia.

Phototherapy and exchange blood transfusion (EBT) were the two treatment modalities used for jaundice in the two hospitals. All babies with SBR of 12mg/dl or above had phototherapy. In cases of suspected septicaemia, ampicillin and/or cloxacillin with gentamycin were initially used, but appropriate antibiotic changes were made as necessary when culture and sensitivity reports became available.

Results

Jaundice was diagnosed in 362 (21.4%) of the 1,690 babies delivered at WGH and ISH during the period of study. The proportion of babies who developed jaundice in both hospitals was not statistically different.

In general, the results obtained in the two hospitals were similar and major

differences were only observed between inpatients and outpatients. The results from the two hospitals were therefore, combined and the observed differences highlighted.

During the same period of study, 242 outborn jaundiced babies were seen in the two centres. The overall male: female ratio was 2.1:1; a higher male:female ratio of 3.6:1 was observed among outpatients at ISH while the lowest ratio of 1.2:1 was recorded among the inpatients at WGH. In 112 of the jaundiced inborn babies and 161 of the outborn, the jaundice was severe and these 273 patients form the subjects of the following analysis.

The wages at which jaundice was observed varied between the day of birth and 5 (mean 2.0 ± 1.2) days in inpatients and between day 1 and 14 (mean 3.1 ± 1.7) days in outpatients ($p<0.001$). The mean admission weight was similar in both hospitals, the combined mean admission weights being 2.7 ± 0.7kg for inpatients and 2.7 ± 0.6kg for outpatients ($p>0.5$).

Table 1 compares the relative frequency of individual aetiological factors of jaundice in the outpatients and inpatients in both hospitals. In both hospitals, the main aetiological factors were G-6-PD deficiency, ABO incompatibility, low birthweight (birthweight<2.5kg) and septicaemia. It was only in one (0.4%) baby that the jaundice was due to Rhesus iso-immunisation. In those cases with a diagnosis of ABO incompatibility, all the mothers had blood group 0 while the babies were either group A or B. In both hospitals, significantly higher numbers of outpatients were G-6-PD deficient compared with the inpatients. Also, culture proven septicaemia was more common among outpatients than inpatients. In 34 (21.1%) of the outpatients and 35 (31.3%) of inpatients, no aetiology for the jaundice was identified, while in 25 (23.3%) and 43 (26.7%) of the inpatients and outpatients respectively, two or more factors were associated with jaundice (Table II). Furthermore, G-6-PD deficiency as the only aetiological factor was present in 20.5% and 34.2% of the inpatients and outpatients respectively ($p<0.001$). Table III shows that the incidence of G-6-PD deficiency was highest among the outpatients at ISH ($p<0.01$).

Table IV shows the relative incidence of exposure to potentially icterogenic agents. In both hospitals, this occurred only in babies brought from home. A total of 128 (79.5%) of the babies admitted from home were exposed to at least, one icterogenic agent; in 61 (37.9%), multiple agents were involved. In general, babies admitted to ISH from outside were more frequently exposed to the agents than those babies admitted to WGH. Significantly higher proportion of babies was exposed to menthol and multiple agents at ISH ($p<0.001$) as compared to WGH. Dusting powder and *Mentholatum* were used to treat the cord as antiseptics after fomentation and then bandaged usually with dirty bandages. The herbs used were either *'Agbo-iba'* (concoction for jaundice) or traditional balms prepared with either *'Ori'* (shea butter), yam flour, salt or palm oil. Naphthalene (moth balls) was used to preserve the mothers' and/or babies clothes.

All the 273 babies had phototherapy while 134 (49.1%) had EBT in addition. A higher but non-significant proportion, 56 (50.9%) of the 110 babies at ISH had EBT, compared with 78 (47.9%) of the 163 babies at WGH.

A significantly higher proportion of the outpatients than inpatients had EBT in both hospitals. These were 95 (59.0%) and 39 (34.8%) of the outpatients and inpatients, respectively ($p<0.001$). Thirty-

Table I

Frequency of Individual Aetiological Factors in Severe Neonatal Jaundice

Factors	Inpatients (n = 112)		Outpatients (n = 161)		
	No of Cases	% of Total	No of Cases	% of Total	P
G-6-PD deficiency	37	33.0	88	54.7	< 0.001
ABO incompatibility	33	29.5	42	26.1	NS
Low birthweight	31	27.7	35	21.7	NS
Septicaemia	1	2.9+	14	35.9*	< 0.001
++Rh-HDN	1	0.9	–	–	–
No aetiological factor identified	35	31.3	34	21.1	NS

\+ out of 34 blood cultures
* out of 39 blood cultures
++ Rhesus Haemolytic Disease of the Newborn
NS = Not significant

four (12.45%) of the 273 babies had gross evidence of kernicterus. These consisted of 18 (16.4%) of the 110 at ISH and 16 (9.8%) of the 163 at WGH. While only one (0.9%) of the 112 inpatients developed kernicterus, 33 (20.5%) of the 161 outpatients had kernicterus ($p<0.001$). The only inpatient who developed kernicterus was born at WGH, weighed 1.7kg at birth and had a maximum serum bilirubin of 19.3mg/dl. There was a delay in carrying out EBT in this baby due to the non-availability of suitable blood when required.

Discussion

This study has shown that about one in five babies born in our two hospitals had clinically evident neonatal jaundice. Because of early discharge of some of the babies and the possibility that a few babies who became jaundiced at home might have been missed, the incidence of 21.4% may not be the true incidence of NNJ in the hospitals. The findings however, give an indication of the magnitude of the problems.

The mean ages of the jaundiced babies in the two hospitals were similar. In many of the babies brought from outside, the age at onset of jaundice could not be reliably ascertained, hence, the age at which jaundice was first observed was used. This was significantly higher when compared with the age at which jaundice was noticed in the inpatients. The difference in age at which jaundice was observed in the two

Table II

Combination of Aetiological Factors in Severe Neonatal Jaundice

Factors	In-patients n = 112		Out-patients n = 161		
	No of Cases	% of total	No of Cases	% of total	P
G-6-PD A^- alone	18	16.1	55	34.2	< 0.001
ABO inc. alone	16	14.3	12	7.5	NS
LBW alone	16	14.3	11	6.8	< 0.05
ABO inc. + G6PDA	10	8.9	15	9.3	NS
G6-PDA^- + LBW	8	7.1	9	5.6	NS
ABO inc + LBW	6	5.4	8	5.0	NS
Septicaemia alone	1	0.9	6	3.7	NS
ABO inc. + LBW + G6PDA^-	1	0.9	3	1.9	NS
ABO inc. + LBW + Septicaemia	–	–	2	1.2	NS
ABO inc. + G6-PDA^- + Septicaemia	–	–	2	1.2	NS
G6-PDA^- + LBW + Septicaemia	–	–	2	1.2	NS
G6-PDA^- + Septicaemia	–	–	2	1.2	NS
Rh-HDN	1	0.9	–	–	NS

ABOinc = ABO incompatibility

LBW = Low birthweight

G6-PDA^- = G-6-PD deficiency

groups is probably due to differences in the level of awareness of the disease by the people looking after the two groups of babies since, in most cases of babies in the hospital, it was the attending medical staff who first noticed the jaundice. On the other hand, many of the parents of babies brought from home were not aware of the presence of jaundice until someone pointed it out to them either at home or in the Infant Welfare Clinic, while in some cases, the baby had stopped sucking[5] before the mother sought medical treatment.

The major aetiological factors in the present study were G-6-PD deficiency, ABO incompatibility, low birth weight and septicaemia. This is in agreement with previous reports from Nigeria[2–5 13 14] and Ghana.[15] In about one quarter of cases, no aetiology could be found. Some of these could be physiological jaundice while the other causes were undetermined probably because of inadequate investiga-

Table III

Relative Incidence of G-6-PD Deficiency in Inpatients and Outpatients

	Wesley Guild Hospital			Ife State Hospital			P
	No of Patients	No with G-6-PD deficiency	% of Total	No of Patients	No with G-6-PD deficiency	% of Total	
Inpatients	66	20	30.3	46	17	37.0	NS
Outpatients	97	46	47.4	64	42	65.6	< 0.05
Total	163	66	40.5	110	59	53.6	< 0.05
P	< 0.05			< 0.01			

NS = Not significant

Salicylates	667(9.99)	Wesley Guild	Ife State

Table IV

Exposure to Icterogenic Agents among outpatient Cases

Agents	Total exposed (n = 161)	Wesley Guild Hospital (n = 97)	Ife State Hospital (n = 64)	P
Menthol	82(50.9)	31(32.0)	51(79.7)	< 0.001
Naphthalene	72(44.7)	38(39.2)	34(33.1)	NS
Herbs	27(16.8)	12(12.4)	15(23.4)	NS
Salicylates	16(9.9)	9(11.3)	7(10.9)	NS

Figures in parenthesis are percentages

NS = Not significant.

tions. For instance, blood culture could not be done in some cases of suspected septicaemia. It has however, been shown that there could still remain a significant number of babies in whom no aetiology of the jaundice is found following adequate investigations.[5 7]

There were major differences in the relative incidences of G-6-PD deficiency and septicaemia between the inpatients and the outpatients. The highest male: female ratio of 3.6:1 observed in the outpatients group at ISH could have been responsible for the highest incidence of G-6-PD deficiency in this same group; it goes to emphasise the importance of G-6-PD deficience in the aetiology of jaundice in the outpatient cases.

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Jaundice and septicaemia in the babies admitted from home may partly have a common factor in the way the cord had been treated before admission. A lot of potentially infected materials were used on the cord. These included items such as dusting powder, balms and *'Ori'* (shea butter). At least one of these materials (dusting powder) has been shown to be icterogenic in G-6-PD deficient babies.[16] Another icterogenic agent to which babies brought from home were exposed was naphthalene which is known to be a potent oxidant agent.[18] About 80% of the babies brought from home were exposed directly or indirectly to at least, one potentially icterogenic agent. Though the incidence of exposure to these agents in the present study was much less than that reported from Ibadan,[1 5] it is high enough to explain the differences observed between the association of G-6-PD deficiency and severe jaundice in the inpatients as compared with outpatients in the present study.

Babies admitted from outside to ISH appeared to be more exposed to icterogenic agents than those admitted to WGH. This may represent the true situation but may also be due to the fact that babies at ISH represent more severe cases of NNJ. The higher incidence of exposure to icterogenic agents and more severe form of NNJ may both be explained by the higher incidence of G-6-PD deficiency recorded at ISH.

The standard treatment models used in the management of the cases in this study were phototherapy in all the cases, and EBT in 49.1% of the babies with bilirubin of 12mg/dl and above. The need for EBT was much higher among babies brought from home since jaundice in these babies was generally more severe.

In the present study, 12.5% of the babies with severe jaundice had clinical kernicterus. All except one of these babies were admitted from home. About 20% of babies brought from home with severe jaundice were kernicteric as compared with only 0.9% of inpatients. The only kernicteric baby among the inpatients was a preterm baby. The incidence of 20% of kernicterus among the babies admitted from home with severe NNJ in this study was lower than 47%, 32% and 40% previously reported from Nigeria[1 4] and Ghana[15] but still very high when compared with caucasians where kernicterus in term infants in now very rare.[18] Since most cases of kernicterus were in

the babies brought from home or other maternity hospitals, attempts to reduce the incidence of kernicterus in Nigeria should be directed mainly at this group of babies.

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