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Prevalence And Risk Factors Associate With Neonatal Jaundice At Cape Coast Teaching Hospital (CCTH), Cape Coast

Joyce Oppong
Cape Coast Teaching Hospital (CCTH), Cape Coast, Ghana

Harriet Ampofo
Sammy Otoo Flat, Amamoma – UCC, Cape Coast, Ghana

Charlotte Boakye-Danquah
University Post Office, KNUST Hospital, Kumasi, Ghana

Ivy Nsiah
Ashtown Kumasi, Ghana

Abstract: ***Neonatal Jaundices is a common adverse outcome among neonates in both developed and underdeveloped countries, which is implicated by several neonatal and maternal factors. This study determined the prevalence and determinant of neonatal Jaundice among neonates of mothers visiting the Teaching Hospital in the Cape Coast.***

This cross-sectional study recruited 1011 neonates from Teaching Hospital in the Central Region, Ghana. Neonates-related characteristics and maternal information were obtained using structured questionnaire and hospital's data records.

The overall prevalence of neonatal Jaundices was 32.9%. After adjusting for maternal age, preterm neonates [(aOR= 7.49; 95% CI (7.49(3.35 to 19.04), p<0.0001], mothers who had spontaneous vaginal births [(aOR=1.36; 95% CI (1.02 to 1.79), p=0.0402], advanced maternal age 41-45years [aOR=2.53; 95%CI (1.28 to 4.97), p=0.0099], secondly gravida [aOR=2.87; 95% CI (2.04 to 4.07),p<0.0001], poor breastfeeding practice [aOR= 2.65; 95%CI(1.98 to 3.54),p<0.0001], neonates with septicemia [aOR=6.37(1.84 to 12.64), p<0.0001], neonate with G6PD defect [aOR=3.99, 95% CI(1.76 to 9.07), p=0.0010], neonate with low birth weight [aOR=1.38, 95% CI(1.06 to 1.81), p=0.0188] and neonate with respiratory distress syndrome [aOR=1.54; 95% CI(1.17 to 2.03), p=0.0022] and mothers with post-partum hemorrhage [(aOR=1.73, 95%CI (1.24 to 2.39), p=0.0013] were significant independent risk factors of neonatal Jaundice.

Prevalence of neonatal Jaundice is high among neonate in Central Ghana. These is influence by a number of neonatal and maternal factors. It is incumbent on pediatrician to monitor and manage neonate-related adverse events to reduce development of Jaundice in neonate.

Keyword: Neonatal Jaundice, prevalence, determinants

I. INTRODUCTION

One of the common causes of neonatal admissions to hospitals is neonatal jaundice (Nkrumah, 2016). Severe neonatal jaundice and kernicterus are also reported worldwide, even in healthy term infants. Neonatal jaundice is a common condition worldwide occurring in up to 60% of healthy term babies and 80% of preterm babies within the first week of life (Slusher, Angyo & Bode-Thomas, 2004).

According to Ipek and Bozayakut 2008, the incidence and etiology vary according to ethnic and geographical differences. Unlike developed countries where foeto-maternal blood group incompatibilities are the causes of severe neonatal jaundice, it is mostly prematurity, G6PD deficiency and infections that cause neonatal jaundice in developing countries (Onyearughe, Onyire & Ugboma, 2011). Neonatal jaundice can therefore be said to have modifiable risk factors particularly in developing countries (Sarici, Serdar & Korhmz, 2004).

II. BACKGROUND

Neonatal jaundice (NNJ) is a common condition worldwide occurring in up to 60% of term and 80% of preterm newborns in the first week of life, (Slusher, Angyo & Bode-Thomas, 2004). Newborns show clinical signs which tend to start on the head and face and then spread down the trunk and limbs as a result of high serum levels of bilirubin. Jaundice in newborns is a result of increased release of haemoglobin from breakdown of red cells due to high haemoglobin at birth, as well as due to reduced lifespan of newborn red blood cells (70–80 days) compared to that of adults (90–120 days), and reduced hepatic metabolism of bilirubin due to immature hepatocytes. Most of this newborn hyperbilirubinemia is a natural transition which resolves by the first week of life with maturing of the liver. However, hyperbilirubinemia is also the main reason for hospital admissions and readmission during the neonatal period [1]. Hyperbilirubinemia often results in kernicterus with its attendant medical, economic, and social burden on the patients, families, and societies (Adoba, Ephraim & Adomakowaah, 2018).

Several maternal and neonatal risk factors such as preeclampsia, G6PD deficiency, ABO incompatibility, prematurity, birth weight, intrauterine growth retardation, metabolic abnormalities, neonate's gender, birth weight, and nutrition have been identified as risk factors for neonatal jaundice (Black, Morris & Bruce, 2003).

From the Child Health Outpatient Department of the Korle-Bu Teaching Hospital, Ghana, no day passes without a baby coming in with neonatal jaundice (Nkrumah, 2016). In a retrospective study conducted by in Nigeria, 35% of neonates managed at a neonatal intensive care unit during a 24-month period were result of jaundice (Onyearughe, Onyire & Ugboma, 2011). However, there is insufficiency of data on the prevalence and risk factors of neonatal jaundice in Cape Coast in the central region of Ghana. This study therefore sought to identify the prevalence and possible factors associated with neonatal jaundice at cape coast teaching hospital in the central region of Ghana.

PROBLEM STATEMENT

Every year approximately 10.8 million children under the age five die worldwide, 38% of these death occurs in the first month of life (Black, Morris & Bruce, 2003) South Asia and sub Saharan Africa do not only account for the highest infant and child mortality but also have the highest proportion of developmentally disadvantaged children worldwide (Nkrumah, 2016). Traditionally, global child health initiatives have focused exclusively on curtailing under five mortality rate an important measure of population health (Bhutani, Johnson & Keren, 2004). But lately, this trend has been steadily modified by concerted efforts to also reduce neonatal mortality before year 2015.

Infections, prematurity, and birth asphyxia have attracted much attention as the predominant risk factors for neonatal mortality in developing countries (Jamison, Breman & Measham, 2006). However, severe or clinically significant neonatal jaundice usually requiring phototherapy or exchange blood transfusion is not only a leading cause for hospital admission or readmission in the first week of life but also constitutes an important cause of neonatal mortality (Onyearugha, Onyire & Ugboma, 2011) Survivals of severe neonatal jaundice are also at risk of various lifelong neuro-developmental impairment (Gordon et. al., 2005).

According to (Slusher, Angyo & Bode-Thomas, 2004), Less than 10% of infants with neonatal jaundice in most parts of the developed world will eventually have clinically significant neonatal jaundice. The burden is likely to be substantially higher in Africa, South Asia and Middle East, where Glucose-6-Phosphate Dehydrogenate (G6PD) deficiency is prevalent. Early detection, prompt treatment with phototherapy or exchange blood transfusion (EBT) are effective in curtailing the adverse outcomes in newborns with G6PD deficiency. Emergency treatment for neonatal jaundice was also recommended as part of cost-effective measures for reducing neonatal mortality and for achieving the millennium development goal four (MDG 4) that targeted two-thirds reduction in child mortality rate by year 2015 (Adam, Lim & Mehta, 2016). The dearth of population-based data seems to have been a major obstacle for the inclusion of NNJ in current global health agenda as available studies are mainly hospital-based (Bhutta et. al., 2005). Current intervention strategies covering early detection of risk factors, measurement and monitoring of serum bilirubin levels and treatment regimens are designed for clinical settings and are difficult to implement in communities where high proportions of births occur outside hospitals or where access to health facilities is limited (American Academy of Pediatrics, 2004). Similarly, the dearth of early detection programmed based on objective screening tests has resulted in underestimation of associated developmental outcomes such as sensorineural hearing loss (Gordon, et. al., 2005). Though the rate of severe jaundice among neonates is high with its associated severe complications, data on this is lacking particularly in low resourced counties of which Ghana is one. Again data on the incidence and associated causes and risk factors is almost nonexistent in Ghana.

III. METHODOLOGY

STUDY AREA

The study was done at cape Coast Teaching Hospital

STUDY DESIGN AND TYPE

The study was Descriptive. A retrospective was employed to review folders of neonate admitted from January 2016 to June 2019 a period of three and half years

STUDY POPULATION

The study population were neonates and their mothers.

SAMPLING AND SAMPLING TECHNIQUE

Convenient sampling technique was used since all the neonates admitted within January 2016 to June 2019 period

were included. As well as the mothers whose babies were on admission at the time of the study?

DATA COLLECTION TOOLS

A checklist designed by the researchers was used to audit the records, folders.

DATA ANALYSIS

Data was analyzed using SPSS and presented in tables and graphs.

ETHICAL CONSIDERATION

The research topic was discussed with institutional review board of the Cape Coast Teaching Hospital Board for approval as well as Committee on Human Research, Publications and Ethics of Cape Coast Teaching Hospital before commencement. Informed concert form was given to the mothers who were around. The mothers were ensured of confidentiality.

MATERIALS AND METHODS

A retrospective folder review was performed for all neonates admitted to the pediatric unit of the Cape Coast Teaching Hospital between January 2015 to June 2017.

IV. RESULTS AND DISCUSSION

RESULTS

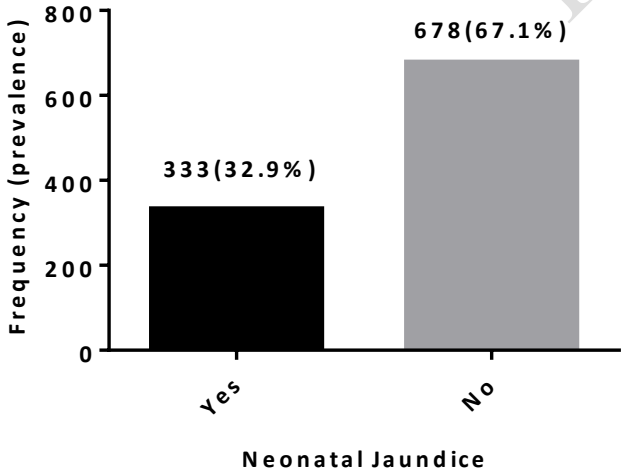

Figure 1: Prevalence of neonatal Jaundice among neonate in the Cape Coast Metropolis

As shown in Figure 1, Out of a total of 1011 neonate, the overall prevalence of neonatal Jaundice was 32.9%. 678 neonates, representing 67.1% of were non-Jaundiced.

Table 1 shows an association between neonatal-related characteristics and the neonatal Jaundice. There was a significant association between neonatal Jaundice and gestational age (p<0.0001), birthweight (p<0.0001), and mode of delivery (p=0.0345). There was a significantly lower average APGAR score in both 1st 1 minutes (p=0.0189) and 2nd 5 minutes (p=0.0309) of neonatal Jaundiced participants compared to non-Jaundiced participants. There was a significantly lower average birthweight among neonatal Jaundiced participants compared to non-Jaundiced neonates (p<0.0001). After adjusting for maternal age, preterm neonates were 7.49 times at increased odds of being Jaundiced [(aOR= 7.49; 95% CI (7.49(3.35 to 19.04), p<0.0001] and mothers who had spontaneous vaginal births were 1.36 times at increased odds of being Jaundiced [(aOR=1.36; 95% CI (1.02 to 1.79), p=0.0402] [Table 1].

Characteristics	Total (1011)	Neonatal Jaundice: Yes (N=333)	Neonatal Jaundice: No (N=678)	Statistics	p-value	aOR (95% CI)	P-value
Neonate Gender				0.42, 1	0.5142		
Male	562	198	364			1.10(0.84 to 1.45)	0.4939
Female	409	135	274			Reference	
Gestational age/weeks				442.5, 1	< 0.0001		
Preterm <34 - 36weeks)	340	261	79			7.49(3.35 to 19.04)	< **0.0001**
Term (37-42 weeks)	671	72	599			Reference	
Birthweight (kg)				21.27, 3	< 0.0001		
<2.0	367	93	274			0.48(0.33 to 0.70)	0.0002
2.0-2.49	112	49	63			1.11(0.69 to 1.78)	0.717
2.5-2.99	187	77	110			0.71(0.48 to 1.02)	0.072
>3.0	345	114	231			Reference	
Place of delivery				2.679, 1	0.1017		
Hospital facility	976	317	659			Reference	
Home	35	16	19			1.75(0.88 to 3.45)	0.1415
Mode of Delivery				4.470, 1	0.0345		
SVD	619	229	390			1.36(1.02 to 1.79)	**0.0402**
Emergency C/S	344	104	240			Reference	
Survival				0.357, 1	0.5498		
Dead	96	29	67			0.87(0.55 to 1.37)	0.6481
Alive	915	304	611			Reference	
Average Apgar score							
1st 1 minutes	7.34 ± 0.81	6.34 ± 0.78	8.34 ± 0.82		0.0189		
2nd 5 minutes	8.05 ± 0.46	7.18 ± 0.35	8.91 ± 0.55		0.0309		
Average Birthweight	3.23 ± 0.72	2.63 ± 0.88	3.82 ± 0.60		< 0.0001		

aOR: adjusted odds ratio

Table 1: Association between neonatal-related characteristics and neonatal Jaundice

Table 2 shows an association of neonatal Jaundice with maternal demographics and obstetrics-related characteristics. There was a significant association between neonatal Jaundice and maternal age (p=0.0082), gravidity (p<0.0001), maternal marital status (p<0.0001), breastfeeding practice (p<0.0001). After adjusting for maternal age, mothers with advanced maternal age of 41-45years [aOR=2.53; 95%CI(1.28 to 4.97), p=0.0099], secundigravida [aOR=2.87; 95% CI(2.04 to 4.07),p<0.0001], and poor breastfeeding practice [aOR= 2.65;

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95%CI(1.98 to 3.54),p<0.0001] were independent risk factors of neonatal Jaundice.

Characteristics	Total (1011)	Neonatal Jaundice Yes (N=333)	Neonatal Jaundice No (N=678)	Statistics	p-value	aOR (95%CI)	P-value
Maternal Age (years)				13.72, 4	0.0082		
20-24	354	108	246			Reference	
25-30	360	105	255			0.94(0.68 to 1.29)	0.7436
31-34	144	56	88			1.45(0.96 to 2.17)	0.0747
35-40	115	44	71			1.41(0.91 to 2.19)	0.1364
41-45	38	20	18			2.53(1.28 to 4.97)	**0.0099**
Parity				1.940, 1	0.1636		
Nulliparous	389	118	271			0.82(0.62 to 1.08)	0.1696
Primiparous	622	215	407			Reference	
Gravidity				40.26, 2	< 0.0001		
Primigravida	292	91	201			1.25(0.91 to 1.71)	0.1924
Secundigravida	208	106	102			2.87(2.04 to 4.07)	< **0.0001**
Multigravida	511	136	375			Reference	
Mother's Marital status				22.11, 2	< 0.0001		
Never Married	131	33	98			0.59(0.38 to 0.89)	0.0132
Married	789	287	502			Reference	
Co-habitation	91	13	78			0.29(0.16 to 0.53)	< 0.0001
Breastfeeding practice				44.96, 1	< 0.0001		
Yes (Good)	640	143	497			Reference	
No (Poor)	319	138	181			2.65(1.98 to 3.54)	< **0.0001**

aOR: adjusted odds ratio

Table 2: Association of neonatal Jaundice with maternal demographics and obstetrics-related characteristics

Table 3 show association between adverse fetal outcomes and neonatal Jaundices. There was a significant association between neonatal Jaundice and septicemia (p<0.0001), G6PD defect (p=0.0004), low birthweight (p=0.0176) and respiratory distress syndrome (p=0.002). After adjusting for maternal age, neonates with septicemia were 6.37 times more likely to develop neonatal Jaundice [aOR=6.37(1.84 to 12.64), p<0.0001], neonate with G6PD defect were 3.99 times more likely to develop neonatal Jaundice [aOR=3.99, 95% CI(1.76 to 9.07), p=0.0010], neonate with low birthweight were 1.38 times more likely to develop neonatal Jaundice [aOR=1.38, 95% CI(1.06 to 1.81), p=0.0188] and those with respiratory distress syndrome were 1.54 times more likely to develop neonatal Jaundice [aOR=1.54; 95% CI(1.17 to 2.03), p=0.0022].

Adverse Fetal Outcomes	Total (1011)	Neonatal Jaundice Yes (N=333)	Neonatal Jaundice No (N=678)	Statistics	p-value	OR(95%CI)	P-value
Septicemia (Yes)	339	243	96	346.6, 1	< 0.0001	6.37(1.84 to 12.64)	< **0.0001**
No	672	90	582			Reference	
G6PD Defect(Yes)	26	17	9	12.72, 1	0.0004	3.99(1.76 to 9.07)	**0.0010**
No	985	316	669			Reference	
Low birthweight (Yes)	379	142	237	5.631, 1	0.0176	1.38(1.06 to 1.81)	**0.0188**
No	632	191	441			Reference	
Apgar<7 after 5 minutes	319	98	221	1.037, 1	0.3086	0.31(0.64 to 1.15)	0.3146
Apgar>7 after 5 minutes	692	235	457			Reference	
Asphyxia (Yes)	272	74	198	5.535, 1	0.0186	0.69(0.50 to 0.94)	0.0194
No	739	259	480			Reference	
Bilirubin encephalopathy(Yes)	296	84	212	3.939, 1	0.0472	0.74(0.55 to 0.99)	0.0475
No	715	249	466			Reference	
Kernicterus (Yes)	411	128	283	1.009, 1	0.3151	0.87(0.66 to 1.14)	0.3404
No	600	205	395			Reference	
Keri Matos (Yes)	307	108	199	1.003, 1	0.3166	1.16(0.87 to 1.53)	0.3442
No	704	225	479			Reference	
Respiratory distress syndrome (Yes)	332	131	201	9.514, 1	0.002	1.54(1.17 to 2.03)	**0.0022**
No	679	202	477			Reference	
Seizure (Yes)	300	89	211	2.066, 1	0.1506	0.81(0.60 to 1.08)	0.1641
No	711	244	467			Reference	
Sepsis (Yes)	389	118	271	1.940, 1	0.1636	0.82(0.63 to 1.08)	0.1696
No	622	215	407			Reference	

aOR: adjusted odds ratio

Table 3: Association between Adverse fetal outcomes and neonatal Jaundices

Table 4 shows an association between Maternal adverse outcomes and neonatal Jaundice. There was a significant association between neonatal Jaundice and antepartum hemorrhage (p=0.0005) and postpartum hemorrhage. After adjusting for maternal age, mothers with post-partum hemorrhage were 1.73 times increased odds of developing neonatal Jaundice [(aOR=1.73, 95%CI (1.24 to 2.39), p=0.0013] [Table 4].

Maternal Adverse Outcomes	Total (1011)	Neonatal Jaundice Yes (N=333)	Neonatal Jaundice No (N=678)	Statistics	p-value	OR (95%CI)	P-value
Antepartum hemorrhage (Yes)	244	58	186	12.24, 1	0.0005	0.56(0.40 to 0.77)	0.0004
No	767	275	492				
Delayed 2nd stage Labour(Yes)	176	68	108	3.133, 1	0.0767	1.35(0.96 to 1.89)	0.0784
No	835	265	570				
Gestational Diabetes (Yes)	303	93	210	0.9869, 1	0.3205	0.86(0.64 to 1.15)	0.3427
No	708	240	468				
Gestational Hypertension(Yes)	255	74	181	2.370, 1	0.1237	0.78(0.58 to 1.07)	0.1431
No	756	259	497				
Postpartum hemorrhage(Yes)	185	80	105	10.89, 1	0.0010	1.73(1.24 to 2.39)	**0.0013**

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No	826	253	573				
Preeclampsia(Yes)	303	109	194	1.805, 1	0.1791	1.21(0.91 to 1.61)	0.1889
No	708	224	484				
Eclampsia(Yes)	168	59	109	0.4340, 1	0.51	1.12(0.79 to 1.59)	0.5296
No	843	274	569				

Table 4: Association between Maternal adverse outcomes and neonatal Jaundice

V. DISCUSSION

PREVALENCE OF NEONATAL JAUNDICE AT CAPE COAST TEACHING HOSPITAL

Neonatal jaundice (severe hyperbilirubinemia) continues to be the most common cause of neonatal readmission for hospitals in North America (Liu et. al., 2000) This pattern continues despite attempts to identify newborns at risk of clinically important hyperbilirubinemia before they are discharged from hospital (Newman & Maisels, 2000). This trend is not different from Africa and more specifically Ghana as this study revealed a prevalence rate as high as 32.9%. It has been reported that neonatal jaundice is the second cause of neonatal admission and fourth cause of neonatal death at the Paediatric unit of the Cape Coast Teaching Hospital (CCTH, 2017). The occurrence of neonatal jaundice of 35.0% of the paediatric report and 32.9% observed in this study goes to confirm that NNJ is highly predominant. This finding is in congruent with Nigeria and other parts of the world's prevalence rate ranging between 10 to 35% (Ipek & Bozayakut, 2008; Sarici et. al., 2004. This study outcome also supports of a Chart review dene at Mother-Baby Unit (MBU) at a secondary government hospital in Kumasi, Ghana, demonstrated that NNJ was the second most common diagnosis among admitted infants during the 16-month study period (30%; 279/944) (Nauzley & Abedini, 2013).

CAUSES OF NEONATAL JAUNDICE AT CAPE COAST TEACHING HOSPITAL

Studies conducted by Sciuto et. al., 2009 in Italy and Nkrumah, 2016 in Ghana revealed G6PD deficiency and Rh and ABO incompatibility as the most frequent causes of neonatal jaundice. These findings are congruent with the findings of this study which revealed significant association between G6PD deficiency and neonatal jaundice. This present study also revealed septicemia, asphyxia, prematurity and Rhesus incompatibility as causes of NNJ which is consistent with the findings of Hossain, Begun, Ahmed, Absar, 2015 and Onyearugha, Onyire, Ugboma, 2011. The findings of this study is also consistent with that of (Adoba, Ephriam & Adomakowah, 2018) who also identified low birth weight, ABO incompatibility, prematurity and G6PD defiency.as causes of NNJ.

IMMEDIATE COMPLICATION RATE AND THE MORTALITY RATE OF NNJ AT CAPE COAST TEACHING HOSPITAL

Several studies have revealed kenicterus as the commonest complication of NNJ however in this study kernicterus was found not to be significant. Respiratory distress syndrome and bilirubin encephalopathy were the two main complications identified in this study which were significant with p values of 0.0022 and 0.0475 respectively.

A study conducted in Accra revealed a mortality rate of 8.6% as a result of kenicterus (Nkrumah, 2016). In this present study the mortality rate was found to be 8.7%. This agrees with the systematic review and meta-analysis which review that only few studies provided information on jaundice-related deaths (Slusher, Zamora & Appiah, 2017). With estimates of 2.8, 30.8 and 50.0 for UK (European), and India (Southeastern) While one study from Pakistan (Eastern Mediterranean), mentions death in 30% of infants with jaundice but stated they did not feel the deaths could be directly attributed to jaundice (Hossain et. al., 2015).

In the Kumasi at Mother-Baby Unit (MBU) study (Nauzley & Abedini, 2013) jaundiced babies did not have increased risk of adverse outcomes (readmission, transfer to a tertiary care facility, or death) this is divergent from this study outcome. This may be due to different certain, since Mother-Baby Unit (MBU) is one out of three units in Kumasi managing neonatal jaundice and the Cape Coast Teaching Hospital neonatal intensive care unit is the only unit serving central and Wasting Region at large.

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