Original Research Article

Early breastfeeding initiation and incidence of severe neonatal jaundice in Chipinge district Zimbabwe

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ABSTRACT

Background: Neonatal jaundice is the most prevalent condition affecting new born babies especially during the first week of life. About 50-60 % of the new born babies get affected with jaundice in the first week of life. The objective of the present study is to determine early breastfeeding initiation (EBFI) and the incidence of severe neonatal jaundice in in the first week of life in Chipinge District, Zimbabwe.

Methods: A prospective cohort was conducted among 200 (100 early initiators and 100 late initiators) healthy term neonates and screening of jaundice was done on day 3 and day 7 using the transcutaneous bilirubinometry (JM 120). Early breast-feeding initiation was defined as the actual giving of the first breastmilk within an hour of birth and anything beyond an hour was considered as late (WHO, 2010). Jaundice was graded from mild (<10mg/dl), moderate (>10<14mg/dl) to severe (15mg/dl or more).

Results: The Pearson correlation for early breastfeeding and severe neonatal jaundice was significant 2 tailed at (P = 0.01) at 95% CI and significant 2 tailed (P = 0.01) at 95% CI delayed breastfeeding initiation and severe neonatal jaundice.

Conclusions: Early breast-feeding initiation had strong association with severe jaundice, significant 2 tailed at (P = 0.01) at 95% CI and significant 2 tailed (P = 0.01) at 95% CI delayed breastfeeding initiation and severe neonatal jaundice. There is need to assess neonatal jaundice objectively as clinical assessment through eye observation has limitation in picking at risk babies.

Keywords: Early breastfeeding initiation, Incidence, Severe jaundice

INTRODUCTION

Neonatal jaundice is the most prevalent condition affecting new born babies especially during the first week of life.[1] About 50-60% of the new born babies get affected with jaundice in the first week of life.[2] Neonatal jaundice is a result of accumulation of bilirubin which is a yellow substance from destructed red blood cells. During the intra uterine life, the placenta plays a pivotal role in excreting bilirubin and other wastes. Following birth, the new born takes over the role of bilirubin clearance from its system. It is also significant to note that neonatal jaundice can be a result of a substance contained in breast milk that inhibits conjugation and clearance of bilirubin, however this type of jaundice occurs after a week of life and persists for 1 to 3 months post-delivery.[4]

Presence of jaundice on the newborn is marked by yellow discoloration of the sclera, skin, mucus membranes and it often progresses form the face, through the chest down to the extremities. Under normal circumstances, neonatal jaundice does not require medical treatment and it is often termed as physiologic jaundice.[5] The serum

bilirubin should range between 5-6 mg/dl. However, if levels of bilirubin exceed 255 µm/l, medical treatment will be required in form of phototherapy.[2] Globally, about 14.1 million newborn babies need phototherapy to treat jaundice.[6] The detection of abnormal levels will often pose a challenge when only clinical assessment of neonatal jaundice is the practice as in developing countries as some babies with severe jaundice may be missed.[4]

Factors associated with neonatal jaundice

Neonatal jaundice is a result of several factors which may be maternal or fetal related. Jaundice can be either maternal or fetal related or in most cases treatment is not required. The relationship between EBFI and neonatal jaundice has received much attention.[7] It is important to take note of different forms of jaundice apart from the physiologic type. In the context of this study, focus was stressed on the non-breastfeeding jaundice as opposed to the breastmilk jaundice. The non-breastfeeding jaundice is characterized by a history of difficulty in establishing breastfeeding and reduced breast milk intake, usually occurs in 2 days to a week post-delivery whereas breast-milk jaundice is a result of a substance in breast milk that interferes with bilirubin conjugation and excretion. The breastmilk jaundice usually occurs a week after birth peaks around 2 weeks and persists for about a month to 3 months and it usually runs in families.[8]

Effects of neonatal jaundice

The increased production of unconjugated bilirubin with limited excretion in the newborn, results in pathologic neurotoxic effects. Neonatal jaundice accounts for 75% of hospital admissions. In yet another study, neonatal jaundice was cited as the precursor behind neonatal morbidity and mortality during the first week of life while those who survive suffer residual neuro development long term effects.[10] In one multi-centre study conducted in six developing countries, severe neonatal jaundice accounted for most severe illnesses that warrant hospitalisation in the first week of life.[11]

METHODS

Following obtaining ethical approval from the Zimbabwe Medical Research Council (MRCZ), a total of 200 healthy term newborn babies were enrolled into a prospective cohort within 24 hours of birth after the mothers had given informed consent between January and mid - June 2017. The cohort was carried out in Chipinge District, Manicaland Province, Zimbabwe. New born babies were recruited from the postnatal wards. Prior recruitment of study participants, research assistants were trained at 7 hospitals facilities in Chipinge district. Training of research assistants included explaining the purpose of study to obtain an informed consent, interviewing process using a structured questionnaire and

screening of neonatal jaundice using a transcutaneous bilirubinometry.

A baseline interview regarding maternal and newborn demographics as well as timing of breastfeeding initiation following giving birth was obtained. Early initiation was defined as giving of the first breastmilk to the baby within an hour following delivery.[12] Any breastfeeding initiation occurring after an hour of birth was regarded as late initiation. Difference in exposure between the two groups was determined by timing of breastfeeding following birth. At time of recruitment, the mothers were examined for pre-existing infections that might predispose to jaundice and any post-delivery complications that might interfere with initiating breastfeeding.

Curbing confounders

The baby was thoroughly examined for any possible factors that might affect suckling as well as predisposing factors to jaundice like Cephalohematoma. Mother and baby pair was followed up on day 3 and day post-delivery. On day 3 and day 7 mothers were interviewed on breastfeeding pattern, support, suckling and latching challenges to assess breast milk intake adequacy while the baby was assessed for presence of jaundice and its severity using the transcutaneous bilirubinometry. Jaundice was graded from mild (>10mg/dl), moderate (>10<14mg/dl) to severe (15mg/dl and more).

The study was conducted at 7 sites in Chipinge district among healthy mother baby pairs. All mothers irrespective of age and parity who had normal vaginal delivery of term healthy infants were included in the study. Multiple, operative, assisted deliveries, preterm births and birth injuries were not included for they were potential confounders to early initiation of breastfeeding as well as severity of jaundice.

Data analysis

Analysis of data was done using the Stata software version 20.0 to compute the following measurements:

Cumulative incidence

The proportion of the newborn babies getting severe neonatal jaundice and this was computed by summation of new cases of severe neonatal jaundice among new born babies who had initiated breastfeeding early and those who had initiated late. The cumulative incidence rate was also computed as the number of severe neonatal jaundice occurring among newborn babies with delayed initiation of breastfeeding.

The relative risk or risk ratio was calculated among the exposed (the late initiators) to the risk among the unexposed (the early initiators).

The risk ratio was computed for the null hypothesis. The risk ratio was calculated by dividing severe neonatal adverse jaundice among newborn babies with delayed breastfeeding initiation by severe neonatal jaundice among neonates with early breastfeeding initiation.

Risk difference is also known as the attributable risk that is the risk of severe neonatal adverse jaundice among the neonates with delayed breastfeeding initiation minus the risk of severe neonatal jaundice among the neonates with early breastfeeding initiation.

Attributable risk percentage was computed for the total percentage risk of severe neonatal jaundice which was a result of initiation timing: risk of unexposed/risk exposed × 100.

RESULTS

All newborn babies enrolled into the study were term and healthy at time of birth and had been delivered normally with an Apgar score of >8 and a birth weight of 2500 grams and above. The proportion of girl infants to boy infants was 49 to 51% among early initiators and 56 to 44 among late initiators. The proportion of early to late initiators was 50%.

Table 1: Demographics characteristics n=200.

Variable	Early (n=100)	Late (n=100)
Gestation at birth >37weeks	100 (50%)	100 (50%)
Age within 24 hours	100 (50%)	100 (50%)
Normal vertex delivery	100 (50%)	100 (50%)
Boys	51 (51%)	44 (44%)
Girls	49 (49%)	56 (56%)
Apgar score >8	100 (50%)	100 (50%)
Birth weight >2500 grams	100 (50%)	100 (50%)
Breastfeeding initiation within an hour	100 (50%)	0 (0%)
Breastfeeding initiation after an hour	0 (0%)	100 (50)
Birth injuries	0 (0%)	0 (0%)

A total of 200 healthy term neonates were followed up at day 3 and 7 post-delivery and screened for severe neonatal jaundice in the first week of life using the transcutaneous bilirubinometry. Table 2 compares early initiators versus late initiators. A considerable higher rate of severe jaundice was noted among the late initiators as opposed to the early initiators. A total of 79 (79 %) had severe jaundice compared among the late initiators with 7 (7%) among the early initiators among.

The cumulative incidence of severe neonatal jaundice was 43% for the total of newborn babies followed up over a period of 1 week follow up. The risk ratio was 1:10 among the early initiators and the late initiators

respectively. The risk difference was 0.72 and the attributable risk percentage was 0.9% meaning there was a difference of 72% in jaundice occurrence among late to early initiators. About 90% of the jaundice that occurred to the exposed group was a result of late initiation of breastfeeding.

Table 2: Initiation of breastfeeding: incidence of severe jaundice, risk ratio, risk difference and attributable risk (n = 200).

Initiation of breastfeeding	Severe jaundice		
	Present	Not present	Total
Early breastfeeding initiation	7	93	100
Delayed breastfeeding initiation	79	21	100
Totals	86	114	200

The Pearson correlation for early breastfeeding and severe neonatal jaundice was significant 2 tailed at (P = 0.01) at 95% CI and significant 2 tailed (P= 0.01) at 95% CI delayed breastfeeding initiation and severe neonatal jaundice.

DISCUSSION

Literature and scientific evidence has proven that EBFI has the potential to avert neonatal deaths by 22% especially in the first week of life.[13] The first breast milk (colostrum) has nutritional and immunologic benefits that are essential for neonatal growth and survival. Colostrum is renowned for gut cleansing and reduction of neonatal jaundice. Despite the benefits of colostrum, EBFI in Zimbabwe has been significantly at 58.2%.[14] There has been a potential benefit between EBFI and neonatal jaundice.

The purpose of the study was to determine the incidence of EBFI and severe neonatal jaundice in Chipinge District, Zimbabwe. Sever jaundice occurring was defined as any jaundice occurring in the first week of life with a reading beyond 15 g/dl. Findings of the study revealed a significant 2 tailed at (P = 0.01) at 95% CI and significant 2 tailed (P = 0.01) at 95% CI delayed breastfeeding initiation and severe neonatal jaundice. A lot of studies have proven strong association between EBFI and incidence of severe jaundice in the first week of life.[8]

However, it is also important to consider breastmilk jaundice in this aspect as studies have also shown that breastmilk can cause jaundice because of the substance contained in human milk that interferes with conjugation and excretion of bilirubin.[4] Nevertheless, breastmilk jaundice usually features after a week post-delivery, peaks at day 14 and persists up to 3 months whereas non - breastfeeding jaundice occurs as early as 2 to 7 days post-delivery.[4] Despite the documented variations in the

causes of neonatal jaundice, EBFI still holds an upper position in averting neonatal jaundice in the first week of life

The transcutaneous bilirubinometry is a critical device for every health institution to have for a lot of babies with severe jaundice are being missed. In one study, total serum bilirubin (TSB) was assessed after clinical indication using a transcutaneous Bilirubinometer and findings revealed a significant correlation, though the significance was not as strong as with black infants.[15] Whilst older transcutaneous bilirubinometry meters (JM102 and JM 104) are affected by skin pigmentation variation, latest JM series (JM104 onwards) including the one used in this study (JM 120) are not affected by skin pigmentation variations. The latest JM series use multi-wave length spectral reflectance that eliminate variability on different skin pigments. Several studies have shown an average correlation of transcutaneous measurement with serum concentration at ($r^2 = 0.88$).[16] Severe jaundice has been variedly graded by different studies depending on the screening device. Jaundice was graded as average at a reading of 5-6 g/dl graded (86-103 micro moles) and severe at a reading of <7 g/dl (104-291 micro moles).[15,17]

Timing of discharge of babies within 24 hours of birth poses a lot challenges as severe jaundice is likely to develop from day 3 up to the end of the week, and possibilities of pathologic jaundice is likely to occur, should the baby fail to report back on day 3. All the babies who had severe jaundice were referred for further management at the same hospital institution.

The findings suggested the need to for non-invasive approach in screening of neonatal jaundice as clinical assessment and eye observation imposes challenges of under estimating presence of jaundice especially in dark pigmented new born babies as with Zimbabwe. Incidence of severe jaundice was found also to be high on both day 3 and day 7 follow up.

CONCLUSION

Neonatal jaundice is the most prevalent condition affecting new born babies especially during the first week of life.[1] Timing of occurrence of any neonatal jaundice coupled with thorough assessment of breastfeeding pattern will help in distinguishing breastmilk jaundice from non-breastfeeding jaundice. Findings of the study revealed a significant 2 tailed at (P = 0.01) at 95% CI and significant 2 tailed (P= 0.01) at 95% CI delayed breastfeeding initiation and severe neonatal jaundice. There is need to assess neonatal jaundice objectively as clinical assessment through eye observation has limitation in picking at risk babies.[18,19]

Early breastfeeding initiation still holds an upper hand in reducing incidence of neonatal jaundice in the first week of life.

REFERENCES

1. Ujaddughe MO, Eigbedion EO, Ujaddughe ME, Okhiai O, Eigiacheyi MA. An overview of neonatal jaundice: the burden and the way forward. Int Res Med Sci. 2016;4(4):60-2.
2. Nadir S, Saleem F, Amin K, Mahmood K. Rational use of phototherapy in the treatment of physiologic jaundice neonatorum. J Pharma Sci Res. 2011;3(1):1-13.
3. Click R, Dahl-Smith J, Fowler L, DuBose J, Deneau-Saxton M, Herbert J. An osteopathic approach to reduction of readmissions for neonatal jaundice. Osteopathic Family Physician. 2013;5(1):1-10.
4. Maisels MJ, DeRidder JM, Kring EA, Balasubramaniam M. Routine transcutaneous bilirubin measurements combined with clinical risk factors to improve the prediction of subsequent hyperbilirubinemia. J Perinatol. 2009;(29):612-7.
5. Maisels MJ, Bhutani VK, Bogen D, Newman TB, Stark AR, Watchko JF. Hyperbilirubinemia in the newborn infant ≥35 weeks' gestation: an update with clarifications. Pediatr. 2009;124(4):1193-8.
6. Kumral A, Ozkan H, Duman N. Breast milk jaundice correlates with high levels of epidermal growth factor. Pediatr Res. 2009;66:218-21.
7. Bhutani VK. Editorial: building evidence to manage newborn jaundice worldwide. Indian J Pediatr. 2012;79(2):253-5.
8. Ennever JF, Sobel, M, McDonagh AF, Speck WT. Phototherapy for neonatal jaundice: in vitro comparison of light sources. Pediatr Res. 2010;18(7):667-70.
9. Cohen SM. Jaundice in the full-term newborn. Pediatr Nursing. 2006;32(3):202-8.
10. Geiger AM, Petitti DB, Yao JF. Rehospitalisation for neonatal jaundice: risk factors and outcomes. Paediatr Perinat Epidemiol. 2001;15(4):352-8.
11. Sgro M, Campbell D, Barozzino T, Shah V. Acute neurological findings in a national cohort of neonates with severe neonatal hyperbilirubinemia. J Perinatol. 2011;31(6):392-6.
12. Young Infants Clinical Signs Study Group. Clinical signs that predict severe illness in children under age 2 months: a multicentre study. Lancet. 2008;371(9607):135-42.

13. WHO. Indicators for assessing infant and young child feeding practices. Part 3: Country profiles. Geneva. 2010.
14. Lamberti LM, Walker CLF, Noiman A, Victora C, Black RE. Breastfeeding and the risk for diarrhoea morbidity and mortality. BMC Public Health. 2011;11:S15.
15. Okwundu CI, Uthman OA, Smith J. Transcutaneous screening for hyperbilirubinemia in neonates. Cochrane Database of Systematic Reviews 2014;4: CD011060.
16. Dennery PA, Seidman DS, Stevenson DK. Neonatal hyperbilirubinemia. New England J Med. 2001;344(8):581-90.
17. Chawla D, Jain S, Dhir S, Rani S. Risk assessment strategy for prediction of pathological hyperbilirubinemia in neonates. Indian Pediatr. 2011;79(2):198-201.
18. Ip S, Chung M, Kulig J, O'Brien R, Sege R, Glicken S, et al. An evidence-based review of important issues concerning neonatal hyperbilirubinemia. Pediatr. 2004;114(1):e130-53.
19. Kaur S, Chawla D, Pathak U, Jain S. Pre-discharge non-invasive risk assessment for prediction of significant hyperbilirubinemia in term and late preterm neonates. J Perinatol. 2012;32:716-21.