Phototherapy & Exchange Transfusion in Neonatal Intensive Care Unit of Pediatric Hospital Kirkuk

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Abstract:

Background: Jaudice is observed in first week of life in most neonates, it is usually benign but untreated severe indirect hyperbilirubinemia is potentially toxic to nervous system of neonates.

Aim of study: Asses effect of some factors on modality of therapy in neonatal jaundice (phototherapy, exchange transfusion). Prematurity & Low birth weight is discussed in some detail.

Methods: This cross sectional study was carried out at neonatal intensive care unit {NICU} of pediatric general hospital Kirkuk from first of March 2018 to first of September 2018 on 307 neonates admitted to hospital,154 of them had jaundice, these neonates were divided to those who had received phototherapy & those who had exchange transfusion, then divided to: term & preterm, normal weight & low birth weight, male & female, then the modality of therapy in each of these groups was analyzed & studied.

Results: It was found that 307 neonates were admitted to NICU, 154 neonates (50.1%) of total admission to neonatal intensive care unit were due to jaundice, 115 neonate (74.6%) received phototherapy, 39 neonate (25.4%) had exchange transfusion. 100 neonates were male (64.9%) & 54(35.1%) were female. Phototherapy is used more frequently in preterm 28(77.7%) & 23(85.2%) LBW neonates than exchange transfusion, which was used in 8(22.3%) preterm & 4(14.8%) LBW. When the association between gestational age and type of therapy is statistically analyzed there was no significant association. No significant association between gender of baby and type of therapy was found. There was no significant association between weight of neonate & type of therapy.

Conclusion: Fifty per cent of admissions to NICU were due to jaundice. Exchange transfusion is still used in relatively height percentage in NICU at Pediatric General Hospital Kirkuk because of late presentation of neonates with jaundice to medical team. Lack of awareness about the toxic effects of high bilirubin on the developing brain among families in our society. In addition old, over used phototherapy equipment in hospital, reduce the effectiveness of phototherapy.

Keywords: Neonatal jaundice, Phototherapy, Exchange transfusion, Low birth weight, Term, Preterm.

Introduction:

hyperbillirubinemia is a common & in most cases benign problem in neonates. Nontheless untreated severe indirect hyperbilirubinaemia is potentially neurotoxic, & cojugated direct hyperbilirubinaemia often signifies a serious hepatic or systemic illness. The color usually results from accumulation in skin ofuncojugated, non polar, lipid-soluble billirubin pigment (indirect reacting) [(1)]. Severe neonatal jaundice can cause serious permanent complication called "kernicterus", in which the brain stem nuclei & basal ganglia are damaged, the clinical features include: lethargy, hypotonia,

convulsion, opisthotonus, & mental delay [2].

Exchange transfusion & phototherapy remain the staples of intervention for the jaundiced newborn. Phototherapy was introduced to the medical world at the Rochford "Essex" General Hospital in 1958 by Cremer et al. In the closing paragraph of their paper the authors, with typical reserve, had the following to say about their new discovery: "No prospect can be entertained that this light treatment will prove a substitute for exchange transfusion in the erythroblast infant with active heamolysis, but the method may turn to clinical advantage in controlling the level of serum bilirubin in cases of jaundice of prematurity [3].

For the management of hyperbilirubinemia in low birth weight {LBW} infantes. Phototherapy is generally used according to a sliding scale: the lower the birth weight or gestation, the lower the TSB level at which phototherapy is instituted [4].

Certainly phototherapy, if used appropriately, is capable of controlling the bilirubin levels in almost all LBW [low birth weight infants weigh less than 2500 g, up to & including 2499g], with the possible exception of the occasional infant with severe erythroblastosis fetal is or pronounced bruising. Furthermore, exchange transfusion, when performed at low bilirubin levels used for treatment in LBW infants, is very inefficient & is less effective than phototherapy in achieving prolonged reduction of TSB in infants with non-hemolytic jaundice [5].

Methods:

A cross sectional study was carried out at neonatal intensive care unit (NICU) of General Pediatric Hospital, at Kirkuk city. By reviewing 307 admission records to NICU from first of March 2018 to first of September 2018. Those neonates with jaundice were included in this study, age from one day old to 30 days old. The data collected consist of: weight, term, preterm, type of therapy; phototherapy or exchange transfusion, were collected then computed using Microsoft Excel Office. The t test, & Chi-square value test were used. A p-value equal & less than 0.05 was considered significant.

Results:

There was 307 neonates admitted to NICU during the period of this study. 154 neonates had neonatal jaundice, which represent (50.1%) of total admission as in figure (1).

From 154 neonates 39(25.4%) had exchange transfusion &115 (74.6%) had received phototherapy as shown in figure (2).

Of 154 jaundiced neonates 100(64.9%) were male while 54(35.1%) were female as in table (1). 25(25%) male neonates had exchange transfusion while 75(75%) had received phototherapy. About female neonates 14(25.9%) had exchange transfusion while 40 (74.1%) female neonates received phototherapy. chi-sq=0.016, DF=1, p value=0.900 without significance.

When jaundiced neonates were studied according to normal weight & low birth weight {LBW}. 127(82.4%) had normal birth weight while 27(17.6%) were of LBW as in table (2). Those with normal weight 35(27.6%) had exchange transfusion, while 92(72.4%) had received phototherapy. Those of low birth weight 4(14.8%) had exchange transfusion & 23(85.2%) had phototherapy, chi –sq=1.912, DF1, p-value=0.167 without significance.

When preterm & term neonates were studied, the results were 118(76.7%)

were term, 36(23.3%) were preterm as in table (3). Preterm neonates with jaundice 28(77.7%) had phototherapy while 8(22.3%) had exchange transfusion. Term neonates with jaundice 87(73.7%) had phototherapy while 31(26.3%) had exchange transfusion. chi-sq=0.239, DF=1, p-value 0.625 without significance.

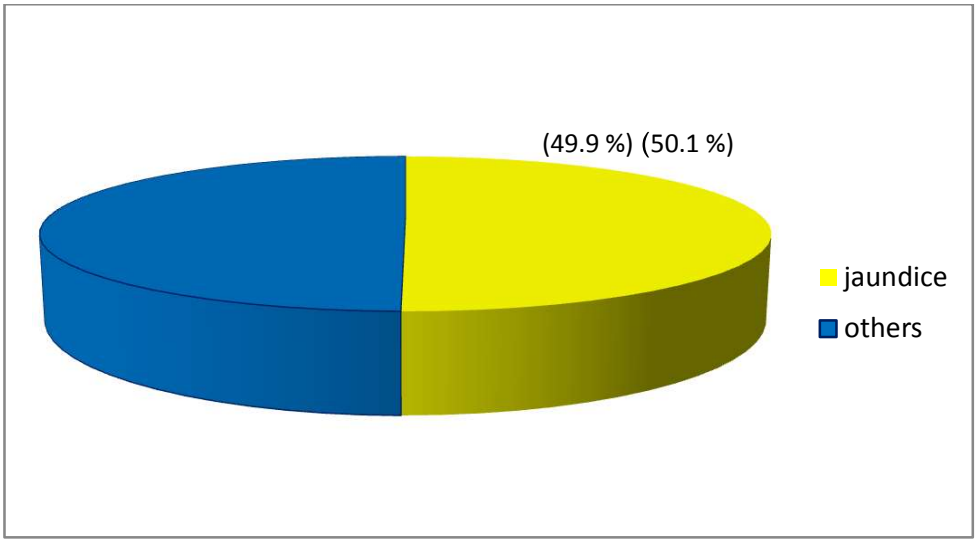

Figure (1): Percentage of jaundiced newborn from total admission to NICU.

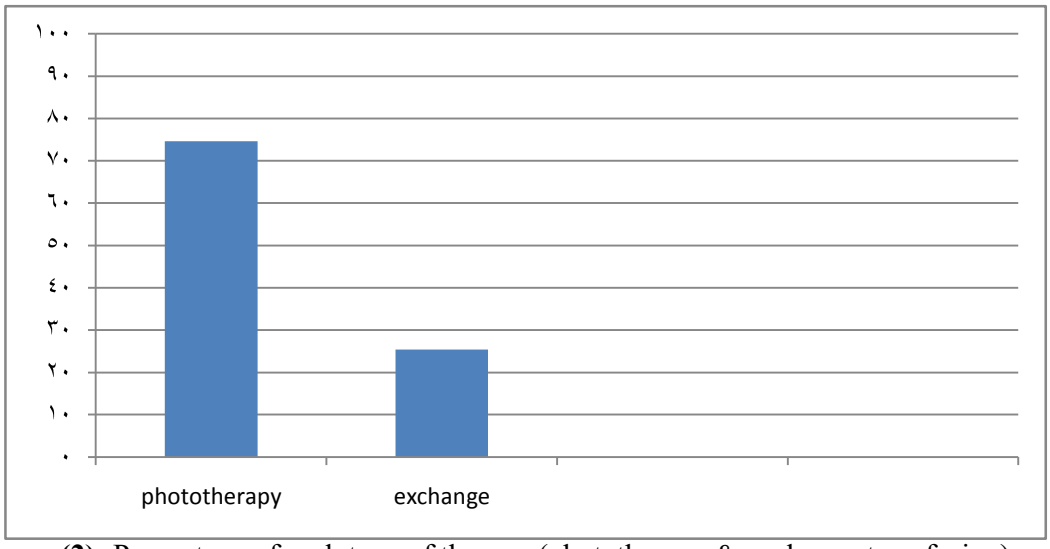

Figure (2): Percentage of each type of therapy (phototherapy & exchange transfusion) used in jaundiced newborns.

Table (1): Gender distribution.

	Male	Female	Total
Exchange	25 (25%)	14(25.9%)	39(25.4%)
Photo	75(75%)	40(75.1%)	115(74.6%)
Total	100 (65.9%)	54(35.1%)	154(100%)

Table (2): Weight distribution.

	Lbw	Normal	
Exchange	4(14.8%)	35(27.6%)	39(25.4%)
Photo	23(85.2%)	92(72.4%)	115(74.6%)
Total	27(17.6%)	127(82.4%)	154(100%)

Table (3): Pereterm & term distribution.

	Perterm	Term	Total
Exchange	8(22.3%)	31(26.3%)	39(25.4%)
Photo	28(77.7%)	87(73.7%)	115(74.6%)
Total	36(23.3%)	118(76.7%)	154(100%)

Discussion:

Jaundice is observed during the first week of life in approximately (60%) of term infants and (80%) of preterm infants [1]. Phototherapy must be started early enough to prevent the expected rise in bilirubin but not at a level which cause unnecessary separation of mother & baby. Where a rapidly rising bilirubin is expected such as hemolytic disease & jaundice at less than 24 hours, phototherapy should be started straight away & the sequential bilirubin results should be graphed [3].

Concerning the need for exchange transfusion ,in this study 39(25.4%) out of 154 had exchange transfusion & 115(74.6%) out of 154 treated by phototherapy while in a study done by Edriss AA, Ghany EA, Razek AR, exchange transfusion done only in 19(10.4%) out of 188 cases, while 169(89.6%) out of 188 cases treated by phototherapy [7]. In another study done by Abd-Ellatif MA, Abd-Ellatif DA, exchange transfusion was indicated in 13(6.1%) out of 212 neonates with hyperbilirubinaemia & 199(93.9%) out of 212 were treated by phototherapy [8].

The aim of treatment is to prevent bilirubin related neurodevelopment handicap while not causing harm. The validity of traditional criteria for exchange transfusion in LBW population has been questioned & the introduction of more effective phototherapy for these infants has rendered much of the debate on exchange transfusion in this population moot. The main stay of treatment for neonatal jaundice in preterm infants is phototherapy [6].

In USA, a study done by Maisels MJ, Watchko JF, they found a dramatic decrease in exchange transfusion for neonates & so it was very difficult, if not impossible to teach pediatric residents in the United States to perform exchange transfusions [3]. Indeed, with newer phototherapy technologies emerging, as well as the potential for pharmacological inhibition of bilirubin production, exchange transfusion in NICU is in danger of becoming extinct [3].

In this study the preterm neonates 8(22.3%) out of 36 had exchange transfusion & those of low birth weight 4(14.8%) out of 27 had exchange transfusion, while in the study done by Davies MW, only 2.5 per 1000 preterm infants had an exchange transfusion & only 1.7 per 1000 low birth weight infants had exchange transfusion [9].

In developed countries like USA, exchange transfusion is seldom used for treatment of jaundice, because phototherapy is very effective especially in LBW while in developing countries

like Iraq exchange is still used in relatively high frequency in neonatal intensive care units ,because late presentation of cases, no education about the dangers of jaundice to the neonatal brain especially in LBW. In addition phototherapy equipment used are not so effective because they are old fashioned & over used, this is supported by other studies like Greco CH. BooNY. Arnold G.Zabetta CD. They said "this report points out the need for: a coordinated world wide effort to define the burden & the causes of sever neonatal jaundice & its consequences; aggressive educational programs for families & health personnel to facilitate timely care-seeking, and accurate diagnosis & effective phototherapy " [10]. Okundo CL, Okoromah CA, Shah PS, they said "Prophylactic phototherapy helps to maintain a lower serum bilirubin concentration & may have an effect on the rate of exchange transfusion and the risk of neurodevelopment impairment. However, further well-designed studies are needed to determine the efficacy & safety of prophylactic phototherapy on long-term outcomes including neurodevelopment outcomes"[11].

Conclusion:

Exchange transfusion & phototherapy remain the stapels of intervention for the jaundiced newborn.

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