

Original article

Association Between Neonatal Jaundice and Maternal Oxytocin Infusion in Albayda Medical Center

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ABSTRACT

Background and aims. Neonatal jaundice is one of the most widespread clinical conditions, and the most significant condition that need medical attention. The objective of this study was to determine the relationship between the development of neonatal jaundice and maternal oxytocin infusion for initiation of labor. **Methods.** A prospective case control observational was conducted on 118 neonates with jaundice which followed up for a period of 6 months in the neonatal care unit NCU at Al-Bayda medical center (AMC) – Libya. After exclusion of 20 newborns, the remaining 98 newborns were divided into 2 groups, group A (involve 40 newborns in whom no oxytocin used for mother) and group B (58 newborns were oxytocin used for induction of labour). **Results.** The results showed that the mean of TSB (total serum bilirubin) in group B (there mothers receive oxytocin to initiate labor) were significantly higher than group A (there mothers didn't receive oxytocin), where there was 10 out of 58 neonates in group B their TSB above 12mg/dl and only one newborn of the 40 in group A has a reading of TSB above 12 mg/dl. **Conclusion.** The direct relationship between oxytocin infusion and high-level bilirubin level is hard to confirm in this study because the inclusion of mothers that received oxytocin infusion for induction only.

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INTRODUCTION

Neonatal hyperbilirubinemia is one of the most prevalent clinical conditions, with being observed in approximately 60% of term and 80% of preterm neonates in the first week of life and a normal transitional phenomenon that typically resolves without any treatment for most neonates. However, it is also the leading reason for newborn hospital readmissions worldwide. Hyperbilirubinemia in neonates has been classified as physiological and pathological jaundice [1-3].

Certain factors would predispose the newborn to jaundice and some of the common fetal-maternal risk factors include prematurity, fetal- maternal blood group incompatibility, delivery problems and labor management (type of delivery, skin ecchymosis, and cephalohematoma), and drugs received intrapartum (diazepam, oxytocin) [4-5].

Neonates delivered after oxytocin infusion to mother showed significant hyponatraemia, hypo-osmolality, and increased osmotic fragility of erythrocytes at birth. These biochemical and physiological changes can be explained by the antidiuretic effects of oxytocin accompanying administration of large quantities of electrolyte-free dextrose solutions used to administer it [6,7]. Pathogenesis of such a hyperbilirubinaemia is still a matter of speculation. A relatively immature glucuronyl transferase system due to absence of the hormonal upsurge of normal labour [7]. An increased placento-fetal transfusion due to oxytocin-induced uterine contractions, with resultant increase in red cell mass in neonates [8], have been suggested to explain the pathogenesis of oxytocin-induced neonatal hyperbilirubinaemia [8].

The aim of this study was to find out the association between the development of neonatal jaundice and maternal oxytocin infusion for induction of labour, and if the level of serum bilirubin reached to a levels that necessitate therapy or not.

METHODS

Study design and setting

A prospective case control observational study was conducted on 118 neonates with jaundice who were followed up in the neonatal care unit NCU at Al-Bayda medical center (AMC) – Libya, over a period of 6 months.

This study applied on full term baby complete 37 weeks' gestation of non o blood group mother neither *rh* negative mothers. Of total 20 newborns was excluded because of instrumental delivery, prematurity and body weight less than 2500 g. The remaining 98 newborns were divided into 2 groups, group A (involve 40 newborns in whom no oxytocin used for mother) and group B (58 newborns were oxytocin used for induction of labour at concentration of 5 IU diluted in 500 cc d5% 1-5 mu per minute according to the protocol used in obstetric department at AMC). The serum bilirubin was measured in the first day of life and then assisted by TCB at 3rd and 5th days of life.

Statistical analysis

The data were fed to the computer and analyzed using IBM SPSS software package version 20.0 (Armonk, NY: IBM Corp.). The Qualitative data were described using number and percent while Quantitative data were described using range (minimum and maximum), mean, standard deviation, median and interquartile range (IQR).

Chi-square test was used for categorical variables, to compare between different groups, Mann Whitney test was used for abnormally distributed quantitative variables, to compare between two studied groups. Kruskal Wallis test was used for abnormally distributed quantitative variables, to compare between maternal oxytocin infusion and neonatal hyperbilirubinemia, the results are considered statistically significant if P value is < 0.05.

RESULTS

The gestational age of studied population ranged from 38 to 42 weeks (weeks) with a mean 39.5 weeks. to group A and 39.8 weeks. to group B (Table 1). They had a mean weight of 3380 gm for A group and 3340 gm for B group, ranging from 2500 to 4900 gm. The difference of gestational age and birth weight between the two groups was statistically non-significant. Also the maternal age and number of parities showed no statistical significance (Table 1).

Table 1: Demographic data of the study population

Variable	Group A Mean	Group B Mean	P value
Gestational age (weeks)	39.5 ± 1.95	39.8 ± 1.27	0.508
Weight (gm)	3380 ± 593.55	3340 ± 459.11	0.450
Maternal age (years)	25.75 ± 4.20	26.46 ± 4.66	0.305
Parity	0.89 ± 1.45	1.75 ± 0.78	0.084

Males represent 47% while females 53% of studied population. Sex distribution among newborns in group A was (51%) for male and (49%) for female. While in group B was: males represented (43.1%) and females (56.9%) (Fig. 1).

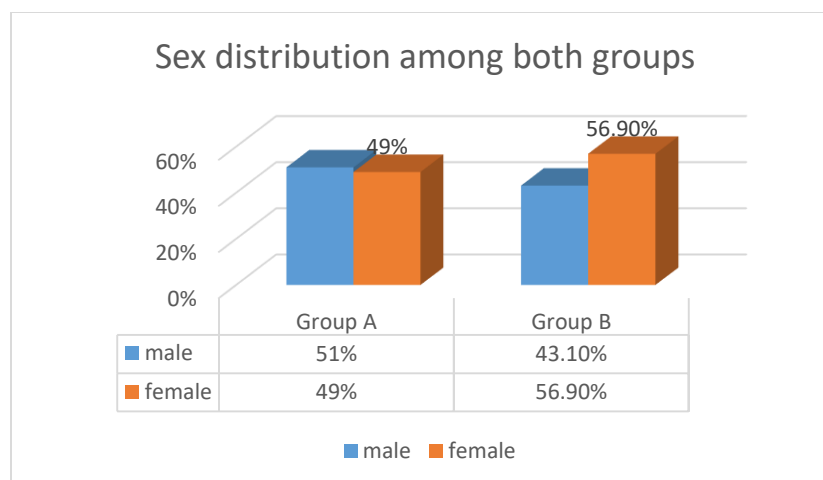


Fig. 1: Sex distribution among both groups

The number of mothers exclusively breast fed their infants during the first day was 30 (75%) in group A and 45 (77.5%) in group B. On day 3 the number of mothers who still do exclusive breast feeding decreased to 26 (65%) in group A and 37 (63.7%) in group B. on day 5 there was 25 (62.5%) mother in group A and 35 (60%) mother who still breast fed their newborns. The pattern of feeding found to be not statistically significant, P value < 0.05 (Table 2).

Table 2: Number of mothers exclusively breastfed the newborn

Day of feeding	Group A	Group B	P value
Day 1	30 (75%)	45 (77.5%)	0.01
Day 3	26 (65%)	37 (63.7 %)	0.03
Day 5	25 (62.5 %)	35 (60 %)	0.03

In this study we found that mean TSB in group B on day 1,3,5 were significantly higher than group A with P value less than 0.05. (table 3) where there was 10 out of 58 neonates in group B their TSB above 12mg/dl and only one newborn of the 40 in group A has a reading of TSB above 12 mg/dl.

Table 3: The mean (\pm SD) of total serum bilirubin concentration (mg/dl) in the two newborn groups

Bilirubin level in days	Group A	Group B	P value
Day 1	2.1 \pm 0.5	3.3 \pm 1	0.07
Day 3	6 \pm 3	8.9 \pm 3.5	0.002
Day 5	5.2 \pm 3	7 \pm 4	0.001

DISCUSSION

Jaundice is considered the commonest condition that lead to NICU admission, and the most significant condition that requires a great anticipation and medical attention [9]. The primary cause of neonatal hyperbilirubinemia is the physiological jaundice of newborn. Some perinatal events have been reported to be associated with an increased incidence of hyperbilirubinemia [10]. These are delayed cord clamping, instrumental delivery and, breech delivery, the use of oxytocin for labor induction or augmentation and administration of epidural analgesia, especially bupivacaine, to the mother [10-12]. The previous studies on neonatal hyperbilirubinemia and the use of oxytocin for the management of labor have produced conflicting results, but it has been widely accepted that oxytocin infusion during labor, increased the risk of neonatal hyperbilirubinemia. As the oxytocin has become an integral and important part of labour management, our study has investigated a maternal antepartum administration to oxytocin”.

The present study's findings imply that the induction of labour with oxytocin infusion may have been responsible for the higher level of bilirubin found in infants born by this way and this finding agree with that of (Chew and Swann) and with that of (Davies et al) [13,14], but difference from the finding of (Gould et al) and (Davidson et al) [15,16]. Their studies showed absence of demonstrable effect of maternal oxytocin infusion on neonatal serum bilirubin level. This could be attributed to their study population, as it included every woman received oxytocin infusion during labour “for induction and augmentation of labour”. As (Calder et al) [17], proposed that the interruption of pregnancy rather than the direct effect of oxytocin is the actual cause of raised level of bilirubin.

In spontaneous onset labour there is a hormonal surge (naturally occurring cortisol spurt toward the end of pregnancy) that found to be lacked in induced labour [18,19]. This corticosteroid spurt might be necessary for preparing infant to extra uterine life as it has an important role in maturation of organ system and enzyme induction. Nowadays an increasing numbers of liver enzymes are known to be cortisol inducible [19,20]. Although the breast feeding and breast milk are a well-known risk factors for NNJ, in our study there was no significant difference between breast fed and artificially fed babies and the findings agree with Gould et al., but differ from study done by Wrong and Wood’s [21,22]. This non-significant difference could be referred to that: in our study the percentage of breast fed to artificially fed babies in both groups are nearly similarly represented. As regard of body weight and gestational age they were nearly the same in the comparable groups.

CONCLUSION

The direct association between oxytocin infusion and high level bilirubin level cannot be proved in this study because we included the mothers who received oxytocin infusion for induction only. Further studies are needed with a larger number. Furthermore, a more detailed investigation of liver cells and red blood cell function to be collected before proving the relation between maternal oxytocin administrations and raised neonatal bilirubin level.

Disclaimer

The article has not been previously presented or published, and is not part of a thesis project.

Conflict of Interest

There are no financial, personal, or professional conflicts of interest to declare.

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