Original article:

Comparative study of effect of mode of delivery: Normal, induced and caesarean section on neonates

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ABSTRACT

Objective: To investigate and compare effect of mode of delivery: normal, induced and caesarean section on neonate

Materials and Method: 110 neonates were divided into three groups according to the mode of delivery (normal, oxytocin induced vaginal delivery & caesarean) and neonatal serum bilirubin levels were estimated and compared with each group.

Results: Out of the 110 subjects, it was found that there is statistically significant increase of neonatal serum bilirubin in oxytocin induced vaginal delivery and caesarean section on day 3. In contrast, on day 1 and day 5, statistically significant neonatal hperbilirubinemia is noticed only in oxytocin induced vaginal delivery.

Conclusion: It is concluded from the present study that neonatal serum bilirubin rises from day 1 to day 3 and then starts decreasing on day 5. On day 3, neonatal serum bilirubin is statistically significantly increased in neonates delivered by oxytocin induced or Caesarean sections.

Keywords: oxytocin, induction, neonatal bilirubin

INTRODUCTION:

Perinatal mortality is a problem of serious dimensions in all countries. It now accounts for about 90% of all foetal and infant mortality in the developed countries. Approximately 63% of infant death occurs between birth and 27 days of life and remainder between 28 days and one year. Main causes of death are intrauterine and birth asphyxia, low birth weight, birth trauma and intrauterine or neonatal infection.[1] Unattended prolonged labour and obstetrics complication also play a major role. It can be minimized by timely induction and acceleration of labour by oxytocic drugs or by caesarean section [2,3]. The most widely used drug that can be used for induction of labour is oxytocin. In 1954 the American biochemist Vincent du vigeneaud was the first to describe an octapeptide amide with the hormonal activity of oxytocin. Even after the discovery of prostaglandin, oxytocin is widely used in most of the hospitals for induction of labour in suitable cases.

There are many factors which can lead to development of hyperbilirubinaemia in a neonate. One of the factor cited by many authors is the liberal use of oxytocin for inducing labor [4,5,6]. Other reasons include immaturity of glucuronyl transferase enzyme, blood group incompatibility, certain drugs used by the mother and abnormal deliveries .

Some studies have also suggested about the dose dependent effect of oxytocin on the level of bilirubin in cord blood [7] It is well known that when oxytocin is administered by continuous IV infusion, it results in expansion of maternal extracellular fluid (ECF) and consequently of the fetal ECF due to their constant

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transplancental equilibrium , by virtue of its antidiuretic effects. As a result the erythrocytes swell and become osmotically more fragile. These swollen and hyperfragile erythrocytes are easily trapped by the spleen, resulting in high bilirubin level[4]Another possible explaination could be enhanced placento-fetal transfusion due to oxytocin-induced uterine contractions, with resultant increase in red cell mass in neonates .[4] While Jouppila R et al (1983) concluded that different anaesthetic agent used during caesarean section have no effect on neonatal hyperbilirubinemia(5). So, our study was aimed at finding out the effect of on neonatal serum bilirubin in normal, Induced and caesarean delivery cases. So the present study was done with an aim to determine the ability to predict severe hyperbilirubinemia in term healthy newborns delivered through various modes of delivery.

MATERIALS AND METHOD :

110 full term parturients were selected for this study at Vardhman institute of medical sciences,Pawapuri. All had uncomplicated pregnancies and were under no medications except for iron preparation . The subjects were divided into three subgroups according to onset of labour and mode of delivery. The first group (group 1)consisted of 30 healthy babies of women who had received oxytocin infusion during labour for induction .Second group(Group 2) consisting of 50 healthy babies of women with normal vaginal delivery following spontaneous onset of labour. Third group (Group 3) consisted of 30 neonates of caesarean section delivery. All the gestation were of 38 weeks duration or more .None of newborn infants had any signs of RDS. Newborn infant who were growth retarded or born with APGAR score of less than 6 were all excluded from the study .Umbilical cord was clamped within 3 minutes of birth and all the babies were breast fed. Approval was obtained from the Institutional Ethical committee and all the participants gave written informed consent. Bilirubin was measured on day1 ,3 and 5 after delivery. About 10 ml of blood samples were collected from umbilical cord from the placental site of the divided umbilical cord cord for day 1 measurement. Later on ,neonatal capillary blood was obtained by heel prick on day 3 and 5 under strict aseptic precautions.Bilirubin was measured by spectrophotometry

All datas are expressed as mean ±standard deviation (S .D) Statistical analyses was done using graph pad instat software .Unpaired t test was used for comparison between dose of oxytocin used for induction of labour and the serum bilirubin levels obtained on the three days Statistical significance was accepted at $P<0.05$.

RESULT:

The datas of 30 neonates in group 1 who were born via vaginal route after labour induction with oxytocin and 50 neonates in group 2 who had normal spontaneous delivery without oxytocin infusion and 30 neonates in group 3 of caseraean section delivery were analysed. The indication for induction were mainly rupture of the membranes and oligohydromnios beyond 39 weeks of gestation The base line characteristicsof the groups were presented in table 1. The difference in number of parity and labour was statistically significant ($p<0.001$) .Mean age and parity of subject in group 1 and group 2 &group 3 was 22.7±4.219 years , 26.38±5.283 years and 26.54±3.2years . Mean gestational ages of the groups were similar. The bilirubin levels in oxytocin induced group 1were significantly higher than those in group 2&3 on day 1 and day 3 (1.366±.2563 versus 1.1662±o.3091 versus 1.09±0.18 , P=0.0039)and (5.719±0.7624 versus 5.2703±0.9497 versus 4.79±0.32 , P=0.0482) respectively while the levels were higher but not significantly so on day 5 (4.661±0.5663 versus 4.4976±1.017 versus 4.501±.46 , P=0.4452)

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Correlation between the doses of oxytocin used for induction and the level of bilirubin on all the 3 days was assessed and no significant correlation was found.

Table 1: The baseline characteristics of the groups

PARAMETERS	GROUP 1(n=30) MEAN ± SD	GROUP2 (n=50) MEAN± S.D	Gr 3
Maternal Age	22.7± 4.219	26.38± 5.283	26.54±3.2
Gravida	1.4±0.4983	2.8775±0.5997	1.4±0.56
Gestational weeks	39.6667±0.6609	39.10±0.8391	38±0.85
Type of delivery	Induced with oxytocin	Spontaneous	Caesarean section

Table 2 : The distribution of metabolic parameters between the group

PARAMETERS (Newborn bilirubin)	Group1 (N=30) Mean± S.D	GROUP 2 (n=50) MEAN± S.D	Group 3 (n=30) MEAN±S.D	P	Significance (p < 0.05)
DAY 1	1.366±0.25	1.1662±0.30	1.09±0.1	0.003	Significant
DAY3	5.719±0.72	5.2703±0.94	4.79±0.3	.0482	Significant
DAY5	4.661±0.56	4.4976±1.017	4.501±.46	0.445	Insignificant

DISCUSSION:

Various studies on neonatal bilirubin levels and the use of oxytocin for the management of labour have produced conflicting results but it has been widely accepted that oxytocin infusion during labour increased the risk of neonatal hyperbilirubinaemia [6,8,9,10,11,12].Our findings on day 1 and day 3 are consistent with these studies. However some other recent studies have not shown any association between oxytocin administered to the mother during labour and serum bilirubin levels in infants [13,14,15] .Our findings on day 5 was in agreement with these studies.

In our present study the level of serum bilirubin levels in group1 were significantly higher than those in group 2 and group3 on day 1 and day 3 (P=0.0039,P=0.0482) respectively while the levels were higher but not significantly so on day 5 (P=0.4452)

However the levels of serum bilirubin of the present study is within the normal limits as bilirubin levels normally rises to 5-10 mg/dl by the 3rd to 4 th days of neonatal life and decreases thereafter . [16]

The elevated bilirubin levels were only of biochemical and not of clinical concern and none of the babies during this period received any phototherapy or any other medical treatment or both.

Several theories have been reported to explain the higher bilirubin level after induction with oxytocin . Singhi et al in his study had explained that oxytocin when administered by continuous IV infusion, results in expansion of maternal ECF with dilutional hyponatraemia and hypo-osmolality by virtue of its antidiuretic effect . Since maternal and fetal body fluids are in constant transplacental equilibrium, an expansion of fetal ECF occurs, as a result erythrocytes swell and become osmotically more fragile. These swollen and hyperfragile erythrocytes are easily trapped by the spleen, resulting in higher bilirubin.[4]

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A relatively immature glucuronyl transferase system due to absence of the hormonal upsurge of normal labour[10] and an enhanced placento-fetal transfusion due to oxytocin-induced uterine contractions, with resultant increase in red cell mass in neonates , have also been suggested.[17]

Other mechanism are trauma to the fetal erythrocyte as a result of uterine activation ,vasoconstrictive effects of oxytocin on uterine blood vessel and hyponatraemia caused by the the administration of large quantities of electrolyte free diluents for oxytocin infusion [5,14,18] .Howevever studies done by Seidmann et al , oppose these assumptions [5] .

Linn et al also reported oxytocin did not affect neonatal bilirubin levels [19.].

Maissels et al reported that breastfeeding and the percentage of weight loss after birth were major determinants for the neonatal jaundice rather than oxytocin infusion in the healthy newborns [20].

The findings of the present study were a bit different from the previous ones as there was significant increase on serum bilirubin in oxytocin induced newborns on day1 and3 but it was not so on day 5 . However,it could be due to the fact that in our study 5% glucose solution was used as a diluents for oxytocin . Omigbodun et al proposed that 5%dextrose used as diluents for oxytocin increase the risk of transplacental hyponatraemia due to the infusion of large volumes of salt free fluid into the mother and neonatal hypoglycaemia and neonatal hyperbilirubinaemia as a consequence[18]. So the increase in serum bilirubin levels on day 1 and 3in the present series could be due to use of 5%dextrose as a diluent for oxytocin rather than oxytocin itself.

Despite our utmost efforts , we might have missed on any events that may have affected the result .Though we did not observe any factors that may have lead to high bilirubin level in the neonatal period. Most importantly our results could be an incidental findings as study group was not very large. Further studies are required for more clarity.

CONCLUSION:

From the present study, comprising of 110 neonates delivered in our institution, it was concluded that neonates delivered from normal, oxytocin induced vaginal delivery and Caesarean section encounter significant changes in relation to total serum bilirubin.

The elevation of transient hyperbilirubinemia is noticed in neonates is maximum in oxytocin induced vaginal delivery which is statistically significant in relation to other groups.

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