"Effect of mode of delivery: normal, induced and caesarean section on neonatal serum bilirubin"

Abha Gupta[1,*], Pratibha Gupta[2], S. Syed Liyakath Ali[3], Sudhanshu Gupta[4]

[1]Associate Professor, Dept. of Physiology, [2]Associate Professor, Dept. of Anatomy, [3]Tutor, IQ City Medical College, Durgapur, West Bengal, [4]DA, DNB Resident, Dept. of Anaesthesia, Durgapur Steel Plant Main Hospital, Durgapur, West Bengal

***Corresponding Author:**
Abha Gupta
Associate Professor, Dept. of Physiology, IQ City Medical College, Durgapur, West Bengal
Email: drabha2020@gmail.com

Abstract

Aim: To compare neonatal serum bilirubin and certain haematological factors in Normal, induced and Caesarean section.
Materials and Methods: 90 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.
Result: Out of the 90 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 start decreasing on day 5. On day 3, neonatal serum bilirubin is statistically significant increase in neonates delivered by oxytocin induced or Caesarean sections.

Keywords: Serum bilirubin, Neonatal hyperbilirubinemia, Oxytocin induced

Access this article online	
Quick Response Code:	Website: www.innovativepublication.com
	DOI: 10.5958/2394-2126.2016.00060.8

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. 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. 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.

Singhi & Singh (1975) suggests infants born after oxytocin showed significant hyponatraemia, hypo-osmolality, and enhanced osmotic fragility of erythrocytes at birth. These biochemical and physiological alterations can be explained by the antidiuretic effects of oxytocin and concomitant administration of large quantities of electrolyte-free dextrose solutions used to administer it. A relatively immature glucuronyl transferase system due to absence of the hormonal upsurge of normal labour (Sims and Neligan, 1975) and an enhanced placento-fetal transfusion due to oxytocin-induced uterine contractions, with resultant increase in red cell mass in neonates (Oski, 1975), have also been suggested.

Robert and waever (1974) demonstrated increased incidence of hyperbilirubinemia and neonatal jaundice in cases of induced or accelerate labour with oxytocin[(1)]. Beazley JM and alderman B (1975) showed a highly significant association between the total dose of oxytocin used for induction and incidence of neonatal hyperbilirubinemia[(2)]. But on the other hand Chew WC and Swan IL (1977) M et al (1978) and Oral E et al (2003) failed to show any significant adverse effects of oxytocic drugs on the foetus in causing increased incidence of hyperbilirubinemia[(3,4)]. 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, total RBC count and haemoglobin in normal, Induced and caesarean delivery cases.

Materials & Methods

The present study was carried out on 90 subjects after obtaining permission of Institute's ethics

committee. Different parameters were measured on 3 different groups - normal spontaneous vaginal delivery (group 1), oxytocin induced vaginal delivery (group 2) and caesarean section (group 3). Each group has 30 neonates under study. New born were observed during their stay in the hospital till the age of five days of post-partum, even when they were discharged. In each case total serum bilirubin level was estimated at birth, on 3rd day and on 5th day. The patients were selected from paediatric nursery in paediatric department of our institution. Details of mode of delivery, anaesthetic records and oxytocin used for induction were carefully studied from case sheets prior to defining the neonate to a particular group.

Exclusion criteria were - patients with IUGR, haemolytic disease, Meconium Aspiration Syndrome, Rhesus and ABO incompatibility. In addition to this, neonates delivered having Elderly, multi gravidae, Maternal comorbidities like hypertension, diabetes, Hepatic – renal disorders etc., maternal history of placenta previa, post-partum haemorrhage, twins, history of caesarean section or uterine scar involving the endometrium, and those requiring oxytocin for labour augmentation rather than induction were also excluded. Pregnant women requiring conversion from failed induction by Oxytocin to caesarean section were also excluded. Inclusion criteria were- neonates of singleton gestation, with live foetus in cephalic presentation at a gestational age of 37 weeks or more and maternal –foetal blood group compatible of either sex were studied.

In group 2, neonates of women delivered through oxytocin induced delivery were studied. Pregnant women at term were administered oxytocin diluted in 500 mL of Ringers solution and infused by an intravenous line piggy backed to a main intravenous line to achieve induction of labour. Induction of labour was defined as contractions of 3-5 contractions per 10 minutes. Low-dose oxytocin protocols entail a starting dose of 2 mU/min followed by incremental increases of 2 mU/min every 15 - 40 min to maximum of 16 mU/min. Amniotomy after induction was not routinely practiced and left on treating obstetrician discretion. Oxytocin was decreased to the previous dose in the presence of uterine tachy systole, defined as >5 contractions in 10 minutes for 20 minutes.

In group 3, neonates of ladies delivered by caesarean section were studied. During Caesarean section, mothers were administered 10- 12.5 mg of 0.5% Hyperbaric Bupivacaine in left lateral position using 25 G Quincke spinal needle. Patients were preloaded with 1 Litre of Ringer Lactate prior to sub arachnoid block. Oxytocin infusion was administered only after delivery of baby. Methylergometerine or Carboprost was not administered for uterine contraction during Caesarean section. Hypotension associated with subarachnoid block was treated with Inj Ephedrine and bradycardia with Inj atropine.

On 1st day, cord blood was collected by inserting a needle into the umbilical vein with the placenta still in utero. On 3rd and 5th day capillary blood was collected by heel prick after cleaning the skin, it was stabbed with a lancet to a depth of about 2mm, and it was rotated before being pulled out. In our study serum bilirubin was estimated by modified Jendrassik & grof method.

Observations & Results

In this study, 90 subjects participated. According to the mode of delivery neonates were segregated into three groups of spontaneous vaginal delivery (group 1), oxytocin induced delivery (group 2) and caesarean section (group 3) subjects. It was compared on these subjects if any bilirubin changes or variations existed between these groups. There were 30 subjects in each group and the total serum bilirubin was measured on the 1st, 3rd & 5th days after delivery.

In the present study, significant rise in serum bilirubin was noticed in group 2 (Oxytocin Induced vaginal delivery) in contrast to other groups. It is significant note that the serum bilirubin level had a rising tendency up to the 3rd day and had a falling tendency afterwards but none reached to the previous normal level on the 5th day. (Table 1) It is suggested that significance is related to the parameter.

On comparison of the mean serum bilirubin level of the 3rd day, the mean value of caesarean delivery group is slightly higher (4.148) than that of the normal delivery group (3.806). The difference between the mean of two groups is statistically significant with a 't' value and 2.7629 and 'p' value of 0.0077. On comparing group 1 and 2 on day 3, mean results of serum bilirubin obtained 3.806 & 4.829 with p value of < 0.0001 extremely statistically significant.

On day 5, comparative analysis of group 1 and 2 was highly significant (p value < 0.0001) whereas in group 1 and 3 found to be non-significant (p value 0.2749).

Table 1: Comparative values of neonatal Serum Bilirubin between 3 groups of deliveries

Day	Groups	Serum Bilirubin in mg/100ml		Standard deviation	't' test	P value
		Range	Mean			
At Birth (or) 1ST Day	Gp – 1(n=30)	0.74 – 1.46	1.040	0.230	4.6637	< 0.0001 (Significant)
	Gp – 2(n=30)	0.90 – 1.62	1.328	0.248		
	Gp – 1(n=30)	0.74 – 1.46	1.040	0.230	1.1205	0.267 (Non-Significant)
	Gp – 3(n=30)	0.63 – 1.24	0.980	0.182		
	Gp – 2(n=30)	0.90 – 1.62	1.328	0.248	6.3618	< 0.0001 (Significant)
	Gp – 3(n=30)	0.63 – 1.24	0.980	0.182		
3rd Day	Gp – 1(n=30)	3.16 – 4.93	3.806	0.586	7.8220	< 0.0001 (Significant)
	Gp – 2(n=30)	3.92 – 5.36	4.829	0.412		
	Gp – 1(n=30)	3.16 – 4.93	3.806	0.586	2.7629	0.0077 (Significant)
	Gp – 3(n=30)	3.46 – 4.60	4.148	0.341		
	Gp – 2(n=30)	3.92 – 5.36	4.829	0.412	6.9744	< 0.0001 (Significant)
	Gp – 3(n=30)	3.46 – 4.60	4.148	0.341		
5th Day	Gp – 1(n=30)	2.86 – 4.28	3.632	0.495	6.0409	< 0.0001 (Significant)
	Gp – 2(n=30)	3.64 – 4.72	4.275	0.308		
	Gp – 1(n=30)	2.86 – 4.28	3.632	0.495	1.1024	0.2749 (Non-Significant)
	Gp – 3(n=30)	3.21 – 4.4	3.768	0.460		
	Gp – 2(n=30)	3.64 – 4.72	4.275	0.308	5.0162	< 0.0001 (Significant)
	Gp – 3(n=30)	3.21 – 4.4	3.768	0.460		

Discussion

Neonatal jaundice is the commonest abnormal physiological finding during first week of life. Increase in the incidence of jaundice might be due to an increase in the use of oxytocic drugs in the management of labour. **Ghosh and Hudson, 1972**[6]. Infants born following spinal block with bupivacaine have also increased risk of jaundice.

On the 5th day, the serum bilirubin level estimated by different authors ranged between 4.3 and 6.3 mg/100ml. The serum bilirubin level on the 5th day of the study is 3.632mg./100ml. **Nelson (1998) and Gupta (1977)** also stated that the serum bilirubin level in full term infants settle down by the end of the first week[7].

The bilirubin level of the 3rd and 5th day of the present series is slightly lower with that of the author's work. This may be due to difference in body built, dietary habits of mother, environment and type of feedings. **Davies (1964)** suggested that infants who are fed late or inadequately in the first few days have higher serum bilirubin level than those fed early and adequately[8]. **Dennery PA, Seidman DS, Stevenson DK (2001)**, stated that infants that fail to feed well are often deficient in the types of intestinal bacteria that metabolise bilirubin and in such cases, significant amount of bilirubin are reabsorbed into blood[9]. In most of the cases in this institution, feeding starts within six hours and this may be one of the factors which results in lowering the serum bilirubin level.

That serum bilirubin level on the 3rd day has gone up about 3 times from the value at birth and declined on 5th day but still remained high than that of the birth value.

The mean serum bilirubin level in induced group at birth as reported by different workers (e.g. **Davies et al, 1973; Davidson, 1973; Gray & Mitchell, 1974; Bearley & Alderman, 1975; Thiery et al, 1975; Chew and Swann, 1977; Sivasuriya et al, 1978)**, lies between 0.51 to2.71mg/100ml. The mean serum bilirubin level of the present work is within the range of reports of different workers. The mean serum bilirubin level on the 3rd day of present work ranged between 4.829mg /100ml whereas reports of different workers of the 3rd day lie between 6.17 – 8.73mg/100ml. This shows slightly decreased value of the present work compared with that of the other. The mean serum bilirubin level on the 5th day of different workers lie between 3.45 – 7.0mg/100ml, whereas the mean level of the 5th day of the present work is 4.275mg/100ml which also is slightly lower in comparison to other co-workers.[8,10,11,3,12)]

Conclusion

From the present study, comprising of 90 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.

References

1. Robert G, Weaver a (1974): Lancet, 1, 935.
2. Beazley JM, Alderman B: neonatal hyperbilirubinemia following the use of oxytocin in labour. Br. J. Obstet. 1975 April 82 (4).
3. Chew WC (1977): Brit Med J 10th Sept .679.
4. Oral E, Gezer a, Cagdas A, Pakkal N: Oxytocin infusion in labour: the effect, different indication and the use of difference diluents on neonatal jaundice. Arch Gynaecol Obstet. 2003 Jan 267(3):117–20.
5. Jouppila R, Laeva L, Jouppila P, Koritom, Pakarinen A: Effect of segmental epidural analgesia on neonatal serum bilirubin concentration and incidence of neonatal hyperbilirubinemia. Acta obstet Gynaecol Scand, 1983;62(2):179–82.
6. Nelson Essential of paediatrics edited by Waldo E – Nelson, Richard E, Behman, Robert Klingman. 3rd edition, WB. Saunders, 1998.
7. Ghosh A, Hudson FP: Lancet 1972:2,283.
8. D.P. Davis, R. Gomersall, R.Roertson, O.P. Gray, A.C. Turnbull: Neonatal jaundice and maternal oxytocin infusion. British Medical Journal, 1973,3;467–477.
9. Dannery PA, saidman DS, Steveours DK: New Eng J Med 344:581.
10. Davidson DC, Ford Ja, Mc Intosh W (1973) British medical journal 4,106.
11. Gray H.G. Mitchell R: Lancet 1974;2,114.
12. Sivasuriya M et al: neonatal Serum Bilirubin level in spontaneous and induced labour. British journal Obstet Gynaecol 1978 Aug;85(8):619–23.