USE OF VITAMIN K IN PRETERM LABOUR AND ITS EFFECT ON NEONATAL COAGULATION PERFORMANCE -- A PRELIMINARY STUDY

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SUMMARY

A prospective study was carried out to assess the effect of maternal administration of vitamin K on coagulation performance of premature neonates. The results showed that prothrombin time and partial thromoplastin time was significantly lower in permature neonates as compared to adults. The administration of Vitamin K significantly improved the coagulation performance of premature neonates in terms of prothrombin time.

INTRODUCTION

Between 10 and 15% of births in developing countries occur before 37 completed weeks of gestation. Prematurity is not only one of the important causes of high perinatal mortality in India but is also associated with high incidence of intraventricular haemorrhage (IVH). The frequency intraventricular haemorrhage is said to be 34-60% (Ahmann et al, 1980 and Mac Donald et al 1984) being especially high in the very preterm neonate weighing 1500 g or less born at a gestational age of less than 34 weeks (Papile et al 1978).

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Many of these bleeding episodes occur very early in an infant's life with upto 75% reported before 48 hours of age (Tsiantos et al, 1974 and Ment et al, 1984). Coagulation abnormalities have been implicated in the pathogenesis of intraventricular bleeding by Setzer et al in 1982, but postnatal correction of clotting abnormalities have shown no decrease in the incidence of intraventricular haemorrhage (Van De Bor et al 1986). Plasma concentrations of vitamin K dependent coagulation factors are reported to be low in both term and preterm neonates comprising only 30-60% of normal adult activity. Vitamin K, therefore, should be effective in preventing haemorrhagic disorders of newborn. Shearer et al (1982) have reported that vitamin K when

administered intrapartum to women in labour crosses the planceta. Hence, theoretically vitamin K administration to women in preterm labour may prolong fetal/neonatal coagulation time during the critical stresses of labour and the first few hours post delivery before the usual postnatal dose of vitamin K has chance to take its effect. In turn, this correction of neonatal clotting status might reduce the frequency of intraventricular haemorrhage.

In this preliminary study the coagulation status of both term and preterm neonates were compared with normal adult levels in an effort to prove the recognised fact that coagulation activity in term and preterm neonates is lower than normal adults. The effect of maternal administration of vitamin K on the coagulation performance of preterm neonates was also determined.

MATERIAL AND METHODS

Women with established preterm labour between 28-34 weeks of gestation were selected for the stuey and assigned randomly to study and control groups.

Control group also included the term neonates and healthy adults.

TABLE I

Neonatal coagulation statum - Term & Preterm neonates

	Term Neonates	Preterm Neonates	Adult Controls	Significance
PT (Secs)	15.3 ± 1.42	14 ± 0.82	11.9 ± 0.9	P < 0.01
PTT (Secs)	55.4 ± 7.32	52.3 ± 3.55	41.6 ± 1.4	P < 0.01

TABLE II

Coagulation performance in preterm neonates of study and control group

	Preterm Neonates (Vitamin K)	Preterm neonates (Not given Vit K)	
PT (Secs)	11.6 ± 1.28	14 ± 0.83	P < 0.01
PTT (Secs)	52.7 ± 7.83	52.3 ± 3.55	NS

In study group, mothers were given 10 mg of vitamin K intramuscularly at least 4-24 hours before delivery. Women who received vitamin K but delivered before 4 hours or after 24 hours were excluded from the study.

Blood coagulability was measured by the prothombin time (Quicks one stage method) and partial thromboplastin time (PTT). 2.7 ml of neonatal blood from the umbilical cord vein was added to 0.3 ml of citrate and PT and PTT determined immediately or at least within half an hour of collection.

Statistical analysis of these parameters was done by T test.

RESULTS

Ten neonates were enrolled in the study group and sixteen in the control group (Term 10 and preterm 6). Thirty adults not known to be suffering from any known coagulation disorders were enrolled as adult controls. All women in the study group had normal vaginal delivery while three cases in the control group delivered by lower segment caesarean section.

There were no gross complications of vitamin K therapy in either mothers or neonates.

Table I shows the coagulation status of term and preterm control neonates compared to that of normal adult controls. The prothrombin time as well as the partial thromboplastin time in preterm neonates were prolonged to 20% and 25% respectively of adult controls. Both these values were statistically significant ($P < 0.01$).

The statistically significant prolongation of 32% in prothrombin time and 33% of partial thromboplastin time was observed in term neonates as compared to adult control.

Table II shows that the prothrombin time was shortened to 11.6 seconds in premature neonates who received vitamin K, as compared to 14 seconds in control premature neonates. The value being statistically significant ($P < 0.01$). However, no significant difference was noted in partial thromboplastin time in the two groups.

DISCUSSION

In the controlled study it was determined that the coagulation status of both term and preterm neonates is significantly lower than that of normal adult. Intranatal maternal administration of vitamin K resulted in a significantly improved prothrombin activity and in a nonsignificant trend, towards improved partial thromboplastin time. This change may be explained by the fact that prothrombin time is directly influenced by the vitamin K dependent coagulation factors. The similar changes have been reported by Pomerance et al in 1987.

Therefore based on this study ita can be said that administration of vitamin K doses improve neonatal coagulation performance but whether or not it decreases the incidence of intraventricular haemorrhage is yet to be established. A larger study is called for incorporating the use of ultrasound for the determination of intraventricular haemorrhage.

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