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Hyponatraemia, birthweight and neonatal jaundice

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Summary

Cord serum sodium levels were estimated in 96 full term singletons delivered by spontaneous vertex delivery. Thirty-two of these infants had cord serum sodium of less than 130 mmol/L and 64 had cord serum sodium of ≥ 130 mmol/L. Serum bilirubin estimated on day 4 of life of the babies demonstrated mean unconjugated bilirubin levels of 105.7mmol/L (S.D.:87.04) and 89.4mmol/L (S.D.:66.18) in the hyponatraemic and normonatraemic groups respectively ($P < 0.05$). The study also demonstrated a higher cord sodium and lower serum unconjugated bilirubin in those babies whose mothers did not receive parenteral fluids. It is suggested that hyponatraemia should be excluded in the aetiology of neonatal jaundice.

Resume

Les niveaux de sodium serique du cordon ombilical etait determine chez 96 singletons nes a terme par l'accouchement a vertex spontane. Trente-deux de ces enfants avaient un niveau du sodium serique du cordon ombilical moin de 130mmol/L et 64 avaient un niveau plus de 130mmol/L. La bilirubine serique determinee le 4 eme jour de vie de ces bebes montrait un niveau non-conjugee de 105,7mmol/L (SD:87,04) et de 89,4mmol/L (SD:66,18). Chez les groupes hyponatremiques et normonatremiques respectivement ($P < 0,05$). L'etude montrait aussi un plus haut niveau de sodium du serum cordon et un plus bas niveau de bilirubine non-conjugee serque chez les bebes donc leurs meres n'avaient pa recu des fluides parente-raux. Il est suggere que l'hyponatremie soit diminee dans l'etiology de la jaunisse neo-natale.

Introduction

Jaundice in the newborn is a universally recognised problem which, in Ibadan, Nigeria accounts for 57.0% of neonatal admissions[1]. Various aetiological factors have been recognised which may act

individually or in combination to cause neonatal jaundice. Such factors include glucose-6-phosphate dehydrogenase (G6PD) deficiency[6], blood group iso-immunization, sepsis and low birthweight[2,3]. Transplacental hyponatraemia has been aetiological associated with neonatal jaundice[4,5] and it has been estimated that jaundice occurred 3.5 times more frequently in newborns with hyponatraemia than with normonatraemia[4].

It is on this basis, that we decided to evaluate the role of cord sodium concentration in the aetiology of neonatal jaundice in Ibadan.

Patients and methods

This was a prospective study in which babies who had spontaneous vertex delivery at term at the University College Hospital, Ibadan, Nigeria, and who had a birthweight of 2500g and above were admitted into the study. Data collected on each delivered baby included maternal age, baby's sex, Apgar scores, birthweight and details of maternal intravenous fluid therapy in labour. The mothers who received parenteral fluids received 5% glucose either to correct dehydration or as a vehicle for oxytocin in the augmentation of labour.

Free flowing cord blood samples were collected. The samples were centrifuged and the plasma separated and stored at -20°C until analysed for serum sodium, by flame photometry. The cord blood G6PD status was also determined by the fluorescent screening test[6]. Other investigations carried out included packed cell volume and serum total and conjugated bilirubin estimations on day 4 of life. Babies with sodium levels less than 130mmol/L were considered to be hyponatraemic.

The data were analysed by Student's t-test with a critical value of 1.96 taken as level of significance.

Results

Ninety-six (96) newborn infants were recruited into

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the study. These were 56 males and 40 females, giving a male to female ratio of 1.4:1. Thirty-two babies had cord serum sodium of less than 130mmol/L while 64 babies had cord serum sodium of 130mmol or more. A comparison of the clinical characteristics of the hyponatraemic and normonatraemic babies is shown in Table 1. Statistically significant differences between the two groups were observed in their birthweights and unconjugated bilirubin levels on the 4th day of life.

Among the mothers, 69 (71.9%) received no intravenous fluids in labour, 12 (12.5%) received 5%

glucose only while 15 (15.6%) received 5% glucose with oxytocin. In the group of mothers who received fluids, 28/69 (40.6%) were hyponatraemic. Among those who received glucose only, 6.12 (50%) were hyponatraemic while 11/15 (73%) of those whose mothers received glucose + oxytocin were hyponatraemic.

The effect of parenteral fluid therapy in labour on the mean cord sodium levels, the bilirubin levels and the birthweights of the infants are shown in Table 2.

Table 1: Comparison of hyponatraemic and normonatraemic babies

Parameter	Hyponatraemia < 130mmol/L n = 32 mean (SD)	Normonatraemia ≥ 130mmol/L n = 64 Mean (SD)	P value
Birthweight (g)	2990(29)	3250(49)	< 0.05
Gestational age (wk)	38.6(1.80)	38.96(1.80)	> 0.05
Maternal age (yr)	27.8(5.10)	28.6(5.61)	> 0.05
Packed cell volume (%)	55.6(5.84)	54.5(10.21)	> 0.05
Unconjugated bilirubin (mmol/L)	105.7(87.04)	89.4(66.18)	< 0.05
Cord Serum Sodium (mmol/L)	118.8(9.17)	130.8(3.87)	< 0.05
G6PD deficiency	0	3	
Apgar Score			
1 min	7.90(1.04)	7.80(1.23)	> 0.05
5 min	10(0)	9.70(0.97)	> 0.05

Table 2: Biochemical parameters and weight in the various fluid regime groups

Fluid therapy	Cord sodium (mmol/L) Mean (SD)	Unconjugated bilirubin (mmol/L) Mean (SD)	Birthweight (g) Mean (SD)
None n = 69	131.56(9.07)	84.13(65.66)	3210(45)
5% Dextrose n = 12	122.20(10.13)	133.72(53.35)	2970(33)
5% Dextrose + Oxytocin	126.43(15.97)	107.70(93.37)	3260(58)

Discussion

Previous reports[2,3] have highlighted the dominant roles of such factors as glucose-6-phosphate dehydrogenase (G6PD) deficiency, blood group iso-immunization, septicaemia and low birthweight in the aetiology of neonatal jaundice. This study has however demonstrated an additional risk factor of cord hyponatraemia in the aetiology of neonatal jaundice in Nigerian neonates, which is similar to the findings of other workers[4,5]. This study also highlighted a significant difference in the birthweight of these 2 groups of neonates despite their similarities in maternal age, gestational age and Apgar scores.

The finding of a higher degree of jaundice in the newborn with hyponatraemia may be due to the impairment of $\text{Na}^+ - \text{K}^+$ ATPase of the erythrocyte membrane[7] coupled with decreased erythrocyte deformability[8] and increased osmotic fragility[9] which may predispose to increased haemolysis with increased bilirubin load on the liver. The tendency to hyperbilirubinaemia may be aggravated by the lower mean birthweights in the hyponatraemic group which may also reflect the presence of greater degree of hepatic immaturity in the handling of bilirubin load[10]. However, hyponatraemia was evident in some infants whose mothers did not receive intravenous fluids as well as in those who had 5% Dextrose or 5% Dextrose and Pitocin.

This study had demonstrated a significant proportion of neonates with hyponatraemia. It is our contention that hyponatraemia should be sought in the further investigation of neonatal jaundice.

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References

1. Bamgboye EA, Familusi JB. Morbidity trends at the Children's Emergency Room, University College Hospital, Ibadan, Nigeria. *Afr. J. Med. Med. Sci.* 1990; 19: 49-56.
2. Effiong CE, Laditan AAO. Neonatal jaundice in Ibadan: A study of cases seen in the outpatient clinic. *Nig. J. Pediatr.* 1976; 3: 1-10.
3. Coulter JBS, Akpabio MA, Jikeme SON, Kay T. Neonatal jaundice in Northern Nigeria. *Nig. J. Pediatr.* 1978; 5: 12-15.
4. Singhi S, Chookang E, Hall St E. Intrapartum infusion of aqueous glucose solution, transplacental hyponatraemia and risk of neonatal jaundice. *Br. J. Obstet. Gynaecol.* 1984; 91: 1014-1018.
5. Spencer SA, Mann NP, Smith ML, Woolfson Am J, Benson S. The effect of intravenous therapy during labour on maternal and cord serum sodium levels. *Br. J. Obstet. Gynaecol.* 1981; 88: 480-483.
6. Beutler E, Mitchell M. Special modifications of the fluorescent screening method for glucose-6-phosphate Dehydrogenase deficiency. *Blood.* 1968; 32: 816-818.
7. Sigstrom L. Role of active sodium and potassium transport in hyponatraemic states in infancy and childhood. *Acta. Pediatr. Scand.* 1981; 70: 353-359.
8. Buchan P. Pathogenesis of neonatal hyperbilirubinaemia after induction of labour with oxytocin. *Br. Med. J.* 1979; ii: 1255-1257.
9. Singh S, Singh M. Oxytocin induction and neonatal jaundice. *Br. Med. J.* 1977; iii: 1028.
10. Connor BH, Seaton PG. Birthweight and use of oxytocin and analgesic agents in labour in relation to neonatal jaundice. *Med. J. Australia* 1982; 2: 466-469.

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