Fecal Sodium and Potassium Losses in Low Birth Weight Infants

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Abstract. We measured 24-hour fecal losses of sodium (Na) and potassium (K) in immediate postnatal period of preterm neonates to determine the role of this route in the electrolyte imbalances seen in such infants. The values from preterm infants were compared to a group of age matched term infants. Eleven studies were done on unfed extremely low birth weight infants (group I, birth weight <1200 gms), seven on fed preterm infants (group II, birth weight 1201-2500 gms) and nine on fed term infants (group III, birth weight 2501-4000 gms). Measured and derived variables compared between the groups were 24 hour fecal volume, total fecal electrolyte contents, Na or K lost per kg of body weight and per gm. of stool and Na or K losses as percent of intake. Although 24 hour fecal volume was lowest in group I, none of the variables related to Na differed between groups I and II whereas all of them were significantly lower in group I when compared with group III. Groups II and III differed only in terms of Na loss/gm stool which was lower in the previous group. Conversely K loss/gm of stool was significantly higher in group I when compared with both groups II and III and the only variable that differed between groups II and III was a higher fecal K content as fraction of intake. Fecal K/Na ratio was highest in group I, and decreased progressively with advancing gestational age, whereas creatinine clearance was lowest in group I and increased along with gestational age. Serum electrolyte levels were normal, although serum Na concentration was lowest in group I and serum K concentration highest in group II. We conclude that very low birth weight infants have relatively higher fecal K concentrations in the first week of extrauterine life, and speculate that this might have physiological significance as these infants are prone to hyperkalemia during this period. (Indian J Pediatr 1993; 60; 631-638)

Key words: Electrolyte imbalances; Preterm neonates; Fecal Na & K content; Fecal K/Na ratio.

Electrolyte imbalances are common in preterm infants especially in those who are born with birth weight less than 1000 grams.1-6 Although the role of kidneys in the maintenance of the composition of extracellular fluid and electrolyte homeostasis, has been extensively studied, that of the gastrointestinal tract which is another important organ for electrolyte regulation is largely undetermined. Furthermore, in preterm infants the intestines are premature and undergo progressive changes in terms of ultrastructure, mucosal enzyme systems and transport processes with advancing gestational and postnatal age.7 The absorptive function as well as the potential for compensatory and adaptive changes to the renal immaturity in such case might be suboptimal and contribute significantly to this problem. The present study was done...
to measure the normal fecal losses of Na and K in healthy preterm and term infants during the first week of extrauterine life in order to determine a possible role of this route in electrolyte imbalances of very low birth weight infants.

**Material and Methods**

Fourteen healthy newborn infants below the age of ten days were randomly selected from the Newborn Nursery and Neonatal Intensive Care Unit of the University of Illinois Hospital at Chicago between July and December 1988, and studied for this purpose. The infants were divided according to the birth weight between groups I (<1250 gms), II (1251-2500 gms) and III (2501-4000 gms). Twenty-four hour studies were performed on each subject which included collection of total amount of stool voided, and measurement of absolute Na and K contents of the sample. Other variables measured were serum Na, K and creatinine (Cr) concentrations, total fluid and electrolyte intakes and urinary output. Body weight was measured on the day of birth within first fifteen minutes of delivery, and then at the beginning of the 24 hour study period.

Stool samples were collected on Saran wraps placed as inner lining of the diaper. U bags were utilized to collect urine and prevent contamination of the stool. Stool samples were collected as soon as voided and immediately frozen for future analysis. Stool Na and K analyses were done by the method as described by Al-Dahhan. Briefly, 24-hour stool sample was transferred to a preweighed dry container, and reweighed to calculate out the weight of the stool. The stool was then homogenized in the container by using a hand mixer with distilled water. One gram of the homogenate was placed in a glass tube to which one milliliter of concentrated nitric acid was added. After thorough mixing, the homogenate was heated and stirred at 100°C until totally clear. Na & K concentrations of this solution were determined by flame photometry, and the absolute Na & K contents of total volume of stool for the 24 hour period were calculated after making correction for the dilution.

Decisions about fluid and electrolyte supplementation were made by the clinical caregiver. Amount of Na & K supplemented was calculated out from the amount of formula provided. Creatinine clearance (Ccr) was measured from serum creatinine utilizing Schwartz’s formula. All calculations were done taking the birth weight into account because of the variability of body weight in the first few days of life. The study protocol was approved by the institutional review committee, and parental written consent was obtained before the enrollment of the subjects in the study.

All data were calculated as mean ± SD, and statistical analysis was done by multiple "t" test for comparison between the groups.

**Results**

A total of twenty-six 24-hour studies were performed, 11 on 5 neonates in group I, 7 on 5 neonates in group II, and 9 on 4 newborn in group III (Table 1). Mean body weight and gestational age for group I were 970 ± 144 gms and 27 ± 2 wks. Those for groups II and III were 1757 ± 361 gms and 32 ± 2 wks, and 3070 ± 192 gms and 39 ± 1 wk, respectively.

Studies were done on mean postnatal day 4.8 in group I, 3.1 in group II and 3.5 in group III. All infants were parenterally fed