THE PATTERN OF THE ELECTROLYTE EXCRETION IN THE URINE OF BABIES BORN TO DIABETIC MOTHERS

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The purpose of this investigation was to determine whether the electrolyte excretion in the urine of babies born to diabetic mothers is within the normal range. It seemed possible that the electrolyte excretion might be abnormal because these babies tend to have a greater birth weight and to show a greater percentage loss of weight in the first week of life than the general range of newborn infants.

Methods

The babies born to diabetic mothers in the Maternity Unit at St. Mary's Hospital during a period of two and a half years were studied. The urine passed during the first 72 hours after birth was collected. The babies were given no food during this time, although two (Babies L. and C.) were given a little water on the second and third days and two (Babies B. and A.) on the third day. The urine was analysed for sodium and potassium by flame photometry and for chloride by a modification of Volhard's method.

Satisfactory collections were made in five of the seven infants born to diabetic mothers during the period of the investigation; in one case (Baby T.) analyses for only 60 hours after birth are reported. (In one case some of the urine was lost. One infant weighed only 3 lb. at birth and collections were not attempted.)

Results

In the Table the approximate gestational age, the mode of delivery, the birth weight and the loss of weight as a percentage of the birth weight are shown.

In Figs. 1 to 3 the sodium, potassium and chloride outputs in the urine are shown superimposed on the

range found in normal infants (calculated from the data of Hansen and Smith, 1953). The cases have been grouped according to the standards for gestational age adopted by the same authors: more premature (under 36 weeks' gestation), less premature (36 to 38 weeks' gestation), and full-term (39 to 40 weeks' gestation). Baby T. is classed in the 'more premature' group because of the obstetric opinion that the gestational age was probably less than 36 weeks, an impression confirmed by the greater percentage loss of weight during the first few days of life.

Discussion

Standards of Comparison. It is difficult when studying physiological functions in the newborn to know what standard of comparison to use. As the weight of a newborn baby changes from day to day, it would be unsatisfactory to compare the electrolyte excretion on the basis of the total body water as has been suggested by McCance and Widdowson (1952) for comparing renal functions at different ages. For the same reason the birth weight is unsatisfactory as a more oedematous or a more premature baby will lose more weight than a non-oedematous or a full-term baby. The lowest weight of the baby during the first week of life would seem to correspond from case to case most closely to the lean body mass, thus eliminating as far as possible variations due to differences in gestational age or in oedema. Some of the babies were born normally and some by Caesarean section. Furuhielm (1954) has shown that, after the first three days, there is a slight difference between the weight loss of infants born by normal delivery or Caesarean section after the onset of labour pains on the one hand, and those born by Caesarean section without labour pains on the other. Therefore, the electrolyte excretion for the first three days after birth is expressed in milliequivalents per kilogram of the lowest weight reached by each baby during the first three days. Hansen and Smith (1953) studied the electrolyte

TABLE
BABIES BORN TO DIABETIC MOTHERS

Baby	Mode of Delivery	Gestational Age (weeks)	Birth Weight (kg.)	Weight Loss (%)
B	Caesarean	40	5.469	9.6
L	Normal	39	2.748	7.9
C	Normal	36	3.106	7.1
A	Caesarean	36	3.669	10.5
T	Caesarean	36	4.023	16.5

excretion in infants born at different gestational ages and their results have been recalculated so as to show a normal range.

Electrolyte Excretion. When compared on the above basis the urinary excretion of electrolytes is within normal limits for the particular gestational age. The small amounts of water given to four of

mothers obtained similar results during the initial fasting period, although they considered that the potassium excretion might be less than in other premature infants with oedema. This trend is seen in Baby T., but it is doubtful whether the difference is significant. No evidence has been obtained in this study to favour the suggestion that there is a

FIGS. 1-3.—The excretion of sodium, potassium and chloride during the first 72 hours of life in five babies born to diabetic mothers.

the infants is unlikely to have influenced the electrolyte excretion, as Hansen and Smith (1953) showed that the electrolyte excretion in normal newborn babies was unaffected by water intake. Zetterström and Åberg (1955) in their study of infants of diabetic

disturbance of electrolyte metabolism, made by Björklund (1953), who studied the electrocardiogram of babies of diabetic mothers.

Summary

The electrolyte excretion in the urine during the first three days of life of five babies born to diabetic mothers was studied.

Taking the excretion in milliequivalents per kilogram lowest weight during the first three days after birth as the standard for comparison, no abnormality in the excretion of sodium, potassium or chloride was found.

The differences in electrolyte excretion between cases could all be accounted for by differences in the gestational age.

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