

A STUDY OF SERUM ELECTROLYTES IN NORMAL PREGNANCIES AND IN TOXAEMIA OF PREGNANCY

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Introduction

Pregnancy is an altered physiological condition which is associated with the growth and development of the foetus and this growth, if it is to be normal must be associated with maintenance of normal stability of the internal environment, which is composed of water and electrolytes.

Survey of literature Chesley (1950) Dieckmann (1952) clearly points out the derangement in sodium and potassium metabolism of the body associated with pregnancy. The neonates of high-risk mothers are found to be more acidotic and recover more slowly than the neonates of normal mothers. Biochemical (e.g. electrolytes) surveillance of the mother may provide early warning of impending difficulties so that during labour or before, timely intervention may be instituted, with this view the present study was undertaken.

Material and Method

The present work has been carried out on the patients attending the labour room, antenatal clinics and the in-patients wards

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The study included two groups of patients. The first group consisted of normal pregnant women. These patients, throughout their pregnancies showed no oedema, albuminuria or raised blood pressure, the chief criteria of toxæmia of pregnancy. The patients in this group delivered normally after 40 weeks of gestation.

The second group included patients having toxæmia of pregnancy, either oedema or albuminuria or both with raised blood pressure of over 140/90 mm/Hg. constituted pre-eclampsia. These features with signs of cerebral irritation or convulsion were included in the group of eclampsia. A thorough clinical examination was done. All the patients whether having normal or toxæmia of pregnancy, were studied during their confinement. Blood was collected from the antecubital vein of the mother.

Sodium and potassium were estimated by flame photometry and chloride by the method of Schales and Scholes (1941).

Observations

One hundred and two patients were studied and results are shown in Tables I, II and III.

TABLE I

Showing the Numbers of Patients of Normal Pregnancy and Toxaemia of Pregnancy

Type of patient	No. of cases
1. Normal Pregnancy	50
2. Pre-Eclampsia	22
3. Eclampsia	25
4. Essential Hypertension	5
Total	102

TABLE II

Showing the Comparison of Serum Sodium in Normal Pregnancies and in Pre-Eclampsia, Eclampsia and Essential Hypertension

Type of cases (no.)	Serum Sodium Level in mEq/L Mean (Range)
(1) Normal Pregnancy (50)	138.1 (130.6-148.0)
(2) Pre-Eclampsia (22)	132.2 (118.4-142.4)
(3) Eclampsia (25)	129.2 (116.3-142.3)
(4) Essential Hypertension (5)	133.0 (120.7-142.5)

TABLE III

Showing the Comparison of Serum Potassium in Normal Pregnancies and in Pre-Eclampsia, Eclampsia, and Essential Hypertension

Type of cases (No.)	Serum Potassium in mEq/L Mean (Range)
(1) Normal Pregnancy (50)	4.3 (3.4-5.3)
(2) Pre-Eclampsia (22)	4.4 (3.2-5.3)
(3) Eclampsia (25)	4.3 (3.1-5.3)
(4) Essential Hypertension (5)	5.1 (4.7-5.6)

Serum chloride levels were found to be between the normal range of 91.5 to 107.1 MEq/L in all the patients in this series.

Discussion

It is the co-ordination of the pituitary-adrenal-renal "Pull and Push" Phenomenon which maintains the normal physiological state of the internal environment.

In pregnancy, the internal environment is seemingly maintained, though in an altered state and yet it is physiological. The preconditioning for this altered state is brought about, not only by hypervolaemia but also by shifting of the electrolyte values.

However, contradictory and conflicting reports have been given by different authors on the serum electrolyte status of the mother in normal and toxaemia of pregnancies which will be pointed of discussion in light of the present study.

In normal pregnancies the renin-angiotensin aldosterone axis functions in such a co-ordinated way that the concentration of the individual electrolytes are within the normal adult range vis a vis non-pregnant women.

The maternal serum sodium level of the normal pregnant women observed in the present studies (Table II) are within the normal limits and are in keeping with the values of the other workers (Raymons 1971), (131.3 mEq/L), Mellor 1969 (138.0 mEq/L) Battaglia 1959 (138.0 mEq/L) Tatum 1954 (142.3 mEq/L).

Tatum (1954) reported that in normal pregnancy, total body sodium and water increase but plasma sodium and potassium are maintained within normal limits. Almost all the sodium retained in pregnancy due to the action of oestrogens progestogens and corticosteroids is held extra cellularly in osmotically inactive form bound to proteins or stored in the bones. Hence, serum electrolytes in normal pregnant women do not show any significant increase.

Maternal serum sodium in toxaemia of

pregnancy (Table II) was found to be appreciably lower than in normal pregnancy. The findings of differences in toxæmia of pregnancy and normal pregnancy is highly significant. The fall in serum sodium of maternal blood in the present series is similar to the data presented by other workers Mellor (1969) Dickmann and Pottinger (1956) Tatum Mule (1956) Tatum (1954).

Lambiotte-Escoffier (1963) opined that toxæmia of pregnancy is characterised by intracellular penetration of sodium and water with consequent decrease in the plasma levels. The retained sodium is held in an osmotically inactive form in excess to that, stored in normal pregnancy in muscles, liver, spleen, etc. Hence the plasma sodium level, though maintained within normal limits in normal pregnancy is reduced in toxæmia of pregnancy.

The mean maternal serum potassium in toxæmia of pregnancy are similar to that found in normal pregnancy and within the normal adult range for Indians (4.9 and 0.7 mEq/L Das Gupta 1956). Similar data have been presented by the other workers Dieckmann Pottinger 1956 (5.1 mEq/L) and Tatum 1954 (4.2 mEq/L). Mellor (1969) and Roy Chowdhary (1971) have shown higher values (6.4 MEq/L and 6.0 MEq/L respectively) for serum potassium in toxæmia of pregnancy.

Conclusion

Although there is a decrease in serum sodium in toxæmia of pregnancy; yet there is a place for sodium restriction in this disease, by mouth or by IV route, because

the toxæmic patients have primarily disturbance in the distribution of water and electrolytes. There is already a load of water and electrolytes in the extravascular compartments as shown by a fall in serum sodium levels. If further sodium is given this will be redistributed mainly to the interstitial compartments and the patient may go on deteriorating.

A more elaborate work for the simultaneous estimation of electrolytes in serum, interstitial fluids and cellular elements of the mother and foetus and in amniotic fluid is required to unfold the mystery of disturbances in electrolyte metabolism in normal and toxæmic pregnancies.

The present work is an additional step in the ladder to such investigations.

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