

## ELECTROLYTE BALANCE IN NORMAL PREGNANCY

By

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*(Received September 2, 1964)*

A study of serum levels of sodium, potassium and chloride and their excretion in urine in 20 non-pregnant and 30 pregnant, healthy adult women have been studied. During pregnancy a fall in serum and urinary sodium and potassium associated with diminution of urinary chloride has been observed. Serum chloride level has not shown any significant change.

Various authors have attributed many factors to the variations in fluid and electrolyte balance during pregnancy. Brown (1958) stated that during pregnancy adrenal cortex secretes its hormones in excess under the influence of corticotrophins produced by the placenta and the anterior pituitary, resulting in salt and water retention. Dieckmann (1952) showed that pregnant women took longer time to excrete a given amount of sodium than the non-pregnant. Coons et al. (1934) and Thompson & Pommerrenke (1938) noted retention of sodium during pregnancy. Harding and Van Wyck (1926) observed a gradual rise in the serum sodium chloride level up to the thirty-sixth week of pregnancy, and then a gradual fall till the end of pregnancy when it attained the normal value. Dieckmann (1941) reported a lower serum sodium level in pregnant than in non-pregnant women. Gray & Plentl (1954) noted an absolute gain in the sodium space from the beginning till the full term of pregnancy.

Several authors, Coons et al. (1934) and Thompson and Pommerrenke (1938) have reported the retention of potassium but Theobald (1955) has mentioned the constancy of this cation in the serum during pregnancy. The changes in fluid and electrolyte balance during pregnancy are not consistent. Hence the present investigation was undertaken to study the blood levels and the urinary excretion of sodium, potassium and chloride during pregnancy.

### METHODS

Twenty healthy, adult, non-pregnant women of the staff of the Zenana Hospital were taken as normal. Thirty healthy normal pregnant cases attending

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TABLE I

*Showing the serum and urine levels of sodium, potassium and chloride in normal non-pregnant subjects.*

Subjects	Blood Sodium (mEq/L)	Blood Potassium (mEq/L)	Blood Chloride (mEq/L)	Urine Sodium (Gm/24 hrs.)	Urine Potassium (Gm/24 hrs.)	Urine Chloride (mg %)
Non-pregnant (20)*	137±1.1 (135.0-141.0)	4.9±0.1 (4.7-5.1)	107.1±1.6 (103.6-109.8)	3.1±0.2 (2.6-3.5)	1.4±0.1 (0.9-1.7)	525.6±43.6 (422.4-680.0)
Pregnant (30)*	134.1±2.2 (126.0—146.9)	3.6±0.2 (3.5—5.6)	106.3±3.3 (98.6—118.2)	2.6±0.3 (0.9-3.1)	1.1±0.1 (0.3-1.4)	438.2±12.9 (301.7-543.1)

\* Number of subjects studied.

Values are Mean — Standard Error; Figures in paraenthesis indicate the range.



the antinatal clinic were selected for observing the changes in pregnancy. Sodium and potassium of serum and of twenty-four hours urine were estimated flame-photometrically. Serum chloride was estimated by Whitehorn's method (1920-21) and the urine chloride by Tarnoky's method (1957).

#### RESULTS

Table 1 summarises the results. It is evident that the serum levels of sodium and potassium show a slight fall while chloride remains unchanged. Urinary levels of sodium, potassium and chloride show a decrease during pregnancy.

#### DISCUSSION

The results in the present study indicate a decrease in the serum level of sodium during pregnancy. This is in accordance with the findings of other workers (Oberst & Plass, 1932; Freyberg et al., 1938; Hughes, 1940; Tatum, 1954; Tampan et al., 1956 and Dieckman et al., 1956) who obtained similar results. Excretion of sodium in 24 hours' urine is less in pregnant women as compared to the non-pregnant cases. Tampan et al., (1956) had also recorded similar observations qualitatively. However quantitatively, fall in the urinary excretion of sodium is less marked in this study. On an average, 0.5 Gm. of sodium is retained daily. This may be considered as an index of the general trend rather than a constant and absolute figure obtainable throughout the entire duration of pregnancy. The underlying mechanism responsible for the sodium retention is elusive. Perhaps, it is attributable to its storage in an osmotically inactive form in the body (Dieckmann, 1952).

The serum chloride level in non-pregnant subjects has been found to be nearly the same as occurs during pregnancy. Again, this is in corroboration with the findings of other workers (Oberst & Plass 1932; Dieckmann and Pottinger, 1956; Tampan et al., 1956). However during pregnancy, there is a decrease in the urinary chloride excretion which is of greater magnitude as compared to the results of Tampan et al., 1956.

It may be pointed out here that the fall in sodium excretion runs parallel to the decrease in chloride concentration. This is due to the chloride metabolism being intimately linked with that of sodium.

The serum level of potassium registers a fall during pregnancy. This is contrary to the findings of previous workers (Dieckmann, 1952; Tampan et al., 1956; Bonsnes, 1956). Likewise, there is a decrease in the urinary excretion of potassium.

The authors are grateful to Dr. (Miss) E. Peter, M. R. C. O. G., for her guidance and providing generous facilities to carry out the work.



## REFERENCES

- Bonsnes, R. W. (1956). *Toxemias of Pregnancy*, p. 27. First Ross Obstetric Research Conference, Columbus (Ohio).
- Browne, F. J. (1958). *Lancet.*, **1**, 115.
- Coons, C.M., Coons, R.R, and Schiefelbusch, A.J. (1934). *J. Biol. Chem.*, **104** : 757.
- Dieckmann, W. J. (1941). *Toxemias of Pregnancy*. P. 215. London, Kimpton.
- Dieckmann, W. J. (1952). *Toxemias of Pregnancy*. P. 485. St. Louis, Mosby Company.
- Dieckmann, W. J. and Pottinger, R. E. (1956). *Am. J. Obst. Gynec.* **71**, 596.
- Freyberg, R. H., Reckie, R. D. and Folsome, C. (1938). *Am. J. Obst. Gynec.*, **36**, 200.
- Gray, M. J. and Plentl, A. A. (1954). *J. Clin. Invest.*, **33**, 347.
- Harding, V. J. and Van. Wyck, H. B. (1926). *Obst. Gynec. Brit. Emp.* **33**, 17.
- Hughes, E. C. (1940). *Am. J. Obst. Gynec.*, **40**, 48.
- Oberst, F. W. and Plass, E.D. (1932). *J. Clin. Invest.*, **11**, 123.
- Tampon, R. K. K , Sundaram, K. & Chamukuttan, C. P. (1956). *J. Obst. Gynec. Ind.* **7**, 1.
- Tarnosky, A. L. (1957). *Clinical Biochemical Methods*, P. 57, London, Hilger and Watts Ltd.
- Tatum, H. J. (1954). *Am. J. Obst. Gynec.* **67**, 1197.
- Theobald, G. W. (1954). *Clin. Sci.*, **1**, 225.
- Thompson, H. E. Jr. and Pommerrenke, W. T. (1938). *J. Clin. Invest.*, **17**, 609.
- Whitehorn, J. C. (1920-21), *J. Biol. Chem.* **45**, 449.
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