

Serum and Placental Histaminase in Normal Bantu Pregnancy and Pregnancy Toxaemia

BY

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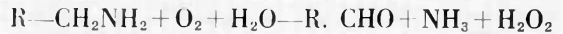
Diamine oxidase is the enzyme responsible for the oxidative deamination of diamines such as cadaverine and putrescine. It has been claimed that histamine is a substrate for this enzyme and that histaminase and diamine oxidase are the same enzyme (Zeller, 1951). The prosthetic group of histaminase or diamine oxidase is in some doubt. Zeller (1951) suggested that flavin-adenine-nucleotide (FAD) might be necessary for the activity of histaminase, while Werle and von Pechmann (1949) found that pyridoxal activated the diamine oxidase of plants.

Sinclair (1952) suggested that the clinical signs of pyridoxine deficiency might be due to increased levels of histamine. He also showed that pyridoxal phosphate was a coenzyme of histaminase. Davison (1956) showed convincingly that pig kidney diamine oxidase and histaminase were a single enzyme with pyridoxal phosphate as the coenzyme.

Using the excretion of xanthurenic acid (4-8 dihydroxy quinoline-2-carboxylic acid) after test loading with dl-tryptophane as index, Wachstein and Gudaitis (1952, a, b; 1953, 1956) demonstrated a deficiency of pyridoxine in pregnant women.

The histaminase content of serum has been investigated by a number of workers (Anrep

et al., 1947; Alhmark, 1944; Kapeller-Adler, 1951; Bradshaw and Jessop, 1955). The histamine-histaminase reaction is commonly represented as follows:—



The method of Kapeller-Adler (1951) is based on the action of the liberated H_2O_2 on indigo carmine in the presence of oxygen when buffered serum is incubated with histamine. The unit used was that amount of enzyme which, when incubated with 1 mg. of histamine for 24 hours at 37° C. and pH 7.2 inactivates enough substrate to give a difference of 0.1 ml. 0.002 N potassium permanganate.

Kapeller-Adler (1951) found a steady increase in titre with advancing pregnancy, while Bradshaw and Jessop (1955) found essentially normal values during toxaemic phases.

Because of the known malnutrition amongst the Bantu and the added nutritional strain of pregnancy, the opportunity was taken of comparing their histaminase values with other published values.

MATERIAL AND METHODS

Specimens were obtained from 90 pregnant patients at varying terms of pregnancy. The sera from seven patients showing signs of toxaemia were also examined. Eight normal placentae and two placentae obtained from toxaemic patients were examined.

Sera were examined in triplicate, using the volumetric permanganate method of Kapeller-Adler (1951), while the placentae were extracted by the later technique described (Kapeller-Adler, 1952). All glassware and rubber bungs were scrupulously cleaned in neutral detergent, well washed with tap water and distilled water, and dried.

Table 1

SERUM HISTAMINASE LEVELS COMPARED WITH THE BLOOD UREA AND SERUM URIC ACID LEVELS IN TOXAEMIC PREGNANCY

Patient	Histaminase Levels KMnO4 Units	Blood Urea mg/100 ml.	Serum Uric Acid mg/100 ml.
1	5.4	43	5.8
2	3.8	51	6.0
3	9.8	60	7.0
4	7.0	50	6.3
5	3.2	83	8.2
6	5.1	30	4.8
7	4.9	24	3.6

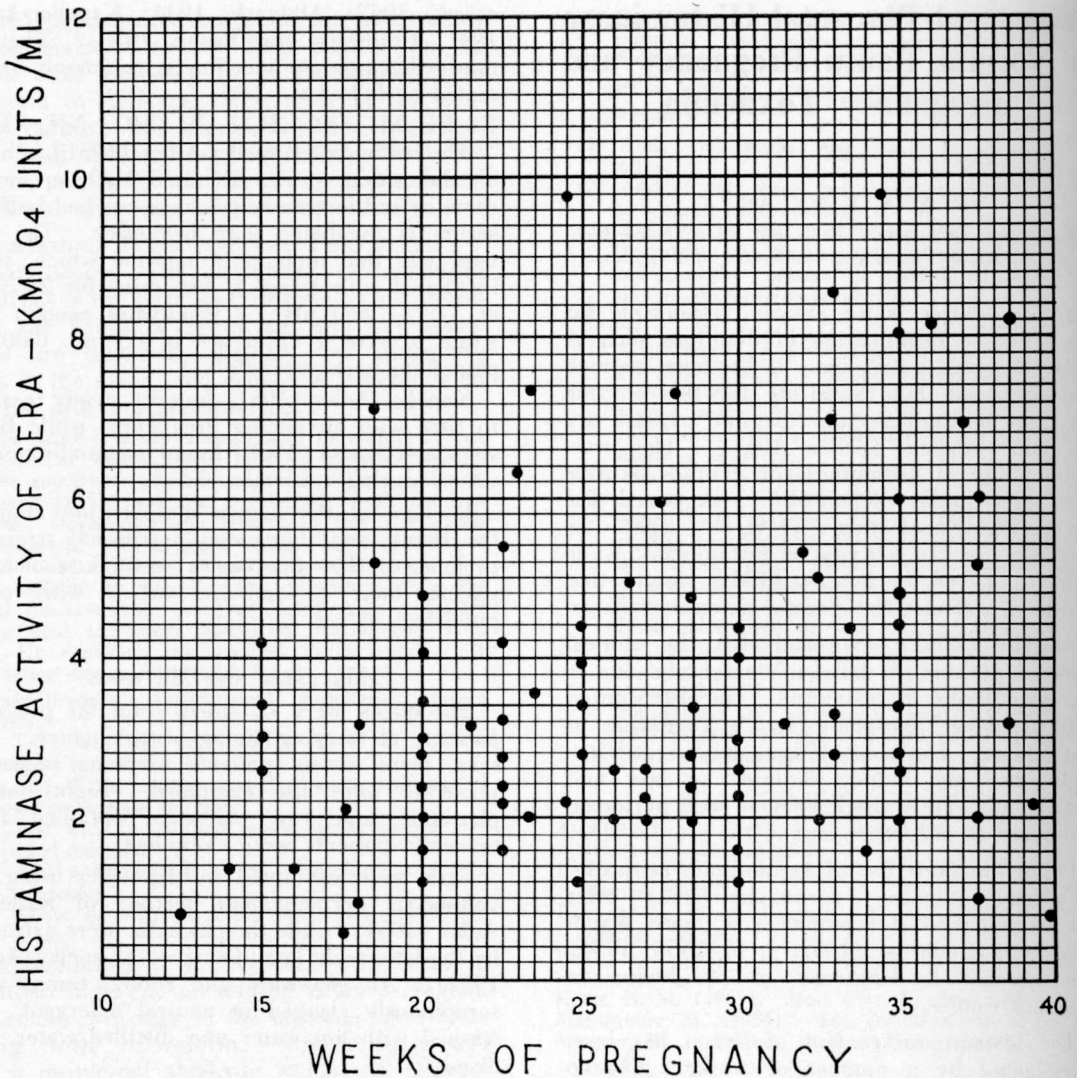


Fig. 1—Scatter of histaminase values at different periods of pregnancy.

Results

Fig. 1 shows the scatter of the results for serum at various periods of pregnancy.

It can be seen that there is a wide scatter of results and, unlike the values given by Kapeller-Adler (1951), there is no steady rise from the fourteenth to the twenty-fourth week, nor is there any definite relation to the period of pregnancy. These results showed a range of 0.9-8 P.U./ml.

The seven toxæmic patients showed levels well within the normal range, varying from 3.2-9.8 units. Table I shows their values along with

the blood urea and serum uric acid levels. Table II shows the placental values. The two placentæ from cases of toxæmic pregnancy showed values of 15.2 and 11.8 permanganate units/g fresh tissue.

DISCUSSION

The results for serum histaminase recorded here for Bantu females confirm in the main the findings of Bradshaw and Jessop (1955) for white women. The values for the Bantu mothers show a wide scatter for similar periods of gestation and cannot be correlated with the period of pregnancy. Histaminase levels in toxæmic

pregnancy were essentially normal and were of no diagnostic or prognostic value. The blood urea and the serum uric acid levels correlated better with the clinical picture.

Table II

HISTAMINASE LEVELS OF NORMAL PLACENTAE.
PERMANGANATE UNITS/G FRESH TISSUE

Placenta No.	Histaminase Level
1	6.9
2	19.4
3	29.2
4	2.0
5	17.3
6	5.4
7	6.0

Kapeller-Adler reported an average value of 99 KMnO4 units/g for normal placentae, whereas my results showed an average value of 12.3 KMnO4 units/g of tissue with a range of 2.0-29.2 units.

SUMMARY

(1) Serum and placenta histaminase values for normal Bantu pregnancies are given.

(2) Serum histaminase and placenta histaminase values are given for toxæmic pregnancy.

(3) Serum histaminase levels carry no diagnostic or prognostic significance in Bantu pregnancy. Blood urea and serum uric acid determinations show much better correlation with the clinical picture.

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