

HUMAN CHORIONIC GONADOTROPIN LEVELS IN INDIAN WOMEN

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Introduction

Detection and assay of human chorionic gonadotropin (HCG) is of great importance with reference to confirming early pregnancy, as also for monitoring abnormal and pathological pregnancies. Assays involving biological as well as immunological procedures have been used for this purpose. This has been excellently reviewed by Hobson (1974). Our earlier studies using the haemagglutination-inhibition test (HIT) revealed that unlike previous reports of HCG levels for Western women, there was no significant peak of urinary HCG during the first trimester in Indian women (Raghavan *et al*, 1973). These results raised several questions, as to the difference noted in HCG excretion patterns. These could be either due to one or more of the following:

(i) a lower production rate

(ii) related to the nutritional status of the women

(iii) due to genetic factors.

The present work was undertaken to study whether the serum HCG was identical to that reported for Western women. Serum HCG throughout pregnancy was measured using a radioimmunoassay.

Materials and Methods

Collection of Serum: Random blood samples were collected from 414 pregnant women attending the N. Wadia Maternity Hospital, Parel. A single sample was collected from the patient. Volunteers selected were those meeting the following requirements:

(i) had normal pregnancies with no complications

(ii) had no bad obstetrics history

(iii) knew the date of their last menstrual period.

The serum was separated and stored frozen at -20°C until assayed. The serum samples were diluted 1:20 with phosphate buffer, pH 7.0 for the assay.

Antiserum to HCG (Anti-HCG) was prepared by immunizing rabbits with 1000 I.U. HCG (APL, Ayerst Lab.) emulsified with Freund's Complete Adjuvant, once a week for 5 weeks. The animal was

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bled 7 days after the last injection. Using this antisera the homologous RIA for intact HCG has been standardized (Dattatreya Murthy *et al.*, 1975).

A highly purified HCG preparation (NIH) was iodinated with I^{125} by the Chloramine-T method described by Midgley (1966). The sensitivity of the assay was 2 mIU/ml serum.

Standard Preparation: The II IR HCG supplied by W.H.O., was used as a standard, and HCG levels reported in terms of I.U./ml II IR HCG.

Results

The HCG levels throughout pregnancy

pregnancy indicated that the levels of the circulating hormone are comparable to those reported for the Western women, indicating that production levels are not lower in Indian women.

Mean HCG levels reported by a number of workers using immunological methods, during the first trimester peak, range between 29-163 IU/ml (Brody and Carlstrom, 1962; Mishell *et al.*, 1963; McCarthy *et al.*, 1964; Teoh, 1967; Faiman *et al.*, 1968; Goldstein *et al.*, 1968; Varma *et al.*, 1970; Crosignani *et al.*, 1971). The peak values obtained using the radioimmunoassay technique by workers is seen in Table I.

TABLE I

Peak Serum hCG Values Reported by Various Workers Using Radioimmunoassays

| Authors | Year | HCG I.U./ml. |
|--------------------------|------|--------------|
| Faiman <i>et al.</i> | 1968 | 40-50 |
| Goldstein <i>et al.</i> | 1968 | 56.7 |
| Varma <i>et al.</i> | 1970 | 163.2 |
| Crosignani <i>et al.</i> | 1971 | 29.0 |
| Present study | 1977 | 40-50 |

are as plotted in Fig. 1. The HCG levels were observed to rise gradually in early pregnancy till they reached peak levels between days 71-80 of gestation. The mean HCG values at peak was 49.48 IU/ml and ranged between 40-50 IU/ml. The levels then gradually decreased and plateaued to lower levels till term. The mean HCG values were 17.0 and 12.0 IU/ml in the second and third trimesters respectively.

Discussion

The results of our earlier study had revealed lower urinary HCG excretion levels in Indian women (Raghavan *et al.*, 1973). These results indicated possible lower production levels. However, serum HCG levels studied throughout normal

Even though a wide variation in values is seen, it is generally agreed that a peak in HCG levels occurs between the 60th and 90th day of gestation. However, a controversy still exists as to whether a small but significant peak in HCG occurs in the third trimester of pregnancy. A second peak with mean HCG levels between 25 and 80 I.U./ml has been reported (Behrmann and Niemann, 1955; Brody and Carlstrom, 1962, 1965; McCarthy *et al.*, 1964; Faiman *et al.*, 1968; Goldstein *et al.*, 1968; Varma *et al.*, 1971). This is controversial to the findings reported by other workers (Albert and Berkson, 1951; Loraine, 1957; Mishell *et al.*, 1963; Teoh, 1967; Crosignani *et al.*, 1971). A second HCG peak was not observed as seen in Fig. 1.

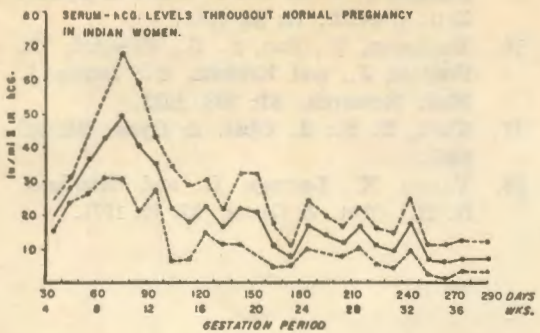


Fig. 1

Fox and Tow (1966) and Teoh (1967) also reported lower urinary HCG levels in Asian women. According to Teoh (1967) serum HCG levels are much higher as compared to urinary levels in Asian women (mean peak HCG 130 I.U./ml). They attributed this discrepancy to be related to differences in drinking and micturating habits of the Asian population.

The results of the present study and that of our earlier observations indicate that there exists no difference in the production of HCG in Occidental and Oriental women as reflected by serum levels. The excretion pattern of the hormone however is lower in Indian women as compared to those reported by for Occidental women. This would possibly be due to a difference in metabolic clearance of the hormone in the Indian Women. Evidence exists to indicate lower excretion of steroidal hormones in Indian women (Iyengar, 1970). It would be of further interest to study whether the metabolic clearance of HCG and other hormones is due to difference in nutritional status or genetic factors.

Summary

Results of our earlier study indicated that there was no significant peak of uri-

nary HCG during the first trimester in Indian women. The present study was undertaken to study the serum HCG patterns throughout normal pregnancy in Indian women using a radioimmunoassay technique. A peak in serum HCG levels during the first trimester, with levels between 40-50 Iu/ml were observed. The mean levels in the second and third trimesters were 17.0 and 12.0 Iu/ml respectively.

Acknowledgement

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