Pakistan Journal of Pharmaceutical Sciences
Vol.8(2), July 1995, pp.39-45

AN ANALYSIS OF SERUM ESTRADIOL AND SERUM PROGESTERONE IN POSTMENOPAUSAL WOMEN OF KARACHI SUFFERING FROM BREAST CANCER

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ABSTRACT

The cancer patients (39) and control (12) were subjected to postmenopausal hormonal evaluation in which serum estradiol and serum progesterone values were found to be 54.56 ± 10.20 pg/ml as compared to 18.66 ± 6.31 pg/ml and 0.170 ± 0.01 ng/ml as compared to 0229 ± 0.01 ng/ml respectively. Consequently it was inferred that in cancer postmenopausal patients when serum estradiol level increases the serum progesterone level decrease and vice versa.

Introduction

The literature survey revealed that the presence of hormones and breast cancer etiology appears to be interrelated. Kubota et al (1981) studied the chemotherapy/ hormone therapy and used tamoxifen and mitomycin C. in the treatment of breast cancer. The remission of mammary carcinomas under hormone therapy requires the tumours to be positive for estrogen receptors and a high degree of remission occurred if the tumours were additionally positive for androgen and progesterone receptors (Caffier, 1982). A comparison of estrogen and progesterone receptor detections in human mammary gland cancer was presented by Eiesmann et al (1983). The measurement of the time-course of estrogen receptor levels in nuclei of the estrogen-response breast tumour cell line MCF-7 during 90-120 minutes exposure of the cells to estradiol at physiological (10^{-8} M), pharmacological (10^{-10} M) and at an intermediate (10^{-6} M) concentrations has been carried out by Umans et al (1984).

Some steroid dynamics in normal and carcinomatous mammary gland has been cited by Vermeulen et al (1986). Estrogen can directly interact with breast cancer cells to modulate gene expression and phenotype properties (Dickson et al., 1987). McCarty et al (1988) applied clinical and basic immunocytochemical analysis on estrogen and progesterone receptor contents in human-cancer. Estrogen regulation of protein synthesis

and cell growth in human breast cancer has been revealed by Cullen et al (1989). The somatic changes were studied in the estrogen receptor gene in breast cancer by Wanless et al (1990). The mechanisms involved in the evaluation of progrstin resistance in human breast cells were investigated by Murphy et al (1991). Keeping these facts in view and that in recent years the number of patients coming from coastal parts of Karachi with breast cancer are strikingly increasing therefore, this study was undertaken.

Materials and Methods

Patients:

For this study the (39) blood sample were drawn from postmenopausal women suffering from breast cancer. All patients are permanent resident of coastal areas of Karachi.

Controls:

The (12) blood sample were taken from postmenopausal women not suffering from any diseases, all of them are resident of Karachi.

Laboratory materials:

All tests were performed by Radioimmuno-Assay procedure and all components were kept at room temperature before use. The following materials were used for performing the test.

a- Serum estradiol/Progesteron Ab-coated tubes.
b- One vial of ^{125}1-serum estradiol/Progesterone liquid (105) ml.
c- Serum estradiol/Progesterone calibrators.
d- Vortex mixer (U.S.A.).
e- Gamma counter (U.K).
f- Plain polypropylene tubes.
g- Micropipettes.
h- Incubation bath.
i- Foam decanting rack.
j- Tri-level human serum based immuno assay control.

Assay of Serum Estradiol

Method:

It is a no-extraction solid phase ^{125}1-radioimmunoassay quantitative coat-A-count serum estradiol measurement technique.

The coat-A-count serum estradiol procedure is based on antibody-coated tubes. ^{125}1-labeled serum estradiol competes with serum estradiol in the patient sample for antibody sites. After 1-3 hours incubation at 37°C on a shaker, separation of bound form was achieved by simply decanting. The tube was then counted in a *T*--counter, the counts being inversely related to the amount of serum estradiol present in the patient sample. The quantity of serum estradiol in the sample (100 tube) was deter-mined by comparing the counts to a standard curve (human serum-based standards having serum estradiol values ranging from 20 to 3600 pg/ml ~ 0.07-13.2 n/mol/lit). Total counts approximately of 50,000 cpm at iodination which correspond to a maxi-mum binding of 35-45%. The sensitivity of the assay was as little as pg/ml using the basic 3 hours from temperature procedure.

Assay of Serum Progesterone

Method

This procedure is also a no extraction, solid phase ^{125}1-radioimmunoassay designed for the progesterone measurement technique. The antibody being immobilized to the wall of the polypropylene tube, decanting the supernatant suffices to *ter*minate the competition and isolate the antibody-bound fraction of the radiolabelled serum progesterone at 37°C. Counting the tube in a gamma counter, then yields a number which is converted *by way* of calibration curve to measure the serum progesterone present in the sample of patients. The determination of 100 tube serum progresterone kit equipped with human serum-based standards, having serum progesterone, values were found in the range from 0.1 to 40 ng/ml (0.3-127 nmol/1). The calibrators are supplied in liquid form, ready to use. The tracer has a high specific activity with total counts of approximately 75,000 cpm at iodination. Maximum binding is approximately 40%.

Results and Discussion

Twelve normal postmenopausal control subjects of age 45 to 60 years, free from cancer and abnormalities, as shown in the data, were subjected to hormonal evaluation of serum estradiol and serum progesterone. The serum estradiol values were deter-mined to lie in the range of 10 to 24 pg/ml. Only two values were found to be above the level of 40 to 46 pg/ml. The normal values of serum estradiol in postmenopausal women reported by Diagnostic Product Corporation (DPC) USA is 14 pg/ml. On the other hand serum progesterone (ng/ml) level in the above mentioned 12 postmenopausal women analyzed between 0.1 ng/ml to 0.75 ng/ml. Only two subjects showed 0.65 to 0.75 ng/ml of serum progesterone. The normal value of progesterone is 0.1 ng/ml reported by DPC (USA). The above values are reported in Table 1.

Serum estradiol levels can be graded into four categories. Each category showed a range of estradiol level as follows:

10-20 pg/ml in 16 patients (41.02% of total)
20-50 pg/ml in 8 patients (20.5% of total)
50-105 pg/ml in 11 patients (2820% of total)
105-310 pg/ml in 4 patients (10.25% of total)

These levels are randomly arranged with respect to serum estradiol in women. In conclusion about 24 patients (61% of total) possesses 10-50 pg/ml nearly corresponding to normal control subjects and rest of the 15 patients had high value of estradiol in their scrum. The serum estradiol values in patients is given in Table 2.

The serum progesterone (ng/ml) levels in postmenopausal patient with breast cancer is given as under:

0.1-0.15 ng/ml in 22 patients (56.40% of total)
0.16-0.32 ng/ml in 11 patients (28.20% of total)
0.38-0.42 ng/ml in 4 patients (10.25% of total)
0.63-0.70 ng/ml in 2 patients (5.13% of total)

The serum progesterone values mentioned in Table 2

The statistical data on postmenopausal serum estradiol and serum progesterone levels in control subject and in cancer patients is represented in Table 3.

Concerning the role of serum estradiol and serum progesterone, 41.02% of total postmenopausal cancer patients have 50-105 pg/ml serum estradiol while 56.40% of total patients possessed 0.1-0.15 ng/ml serum progesterone levels. In general when scrum estradiol levels increases, the serum progesterone level decreases and vice versa in cancer postmenopausal patients.

Table 1
Data of postmenopausal serum estradiol and serum progesterone levels of women without cancer (control)

S. No.	Serum estradiol ($Pg^{/ml}$)	Serum progesterone (ng/ml)
1.	24	0.75
2.	46	0.10
3.	10	0.10
4.	10	0.10
5.	10	0.10
6.	10	0.10
7.	20	0.45
8.	10	0.10
9.	10	0.10
10.	10	0.10
11.	40	0.10
12.	24	0.65
Normal values	14 pg/ml	0.10 ng/ml

Table 2
Serum estradiol and serum progesterone levels in patients

S No.	Serum estradiol (pg/ml)	Serum progesterone (ng/ml)
1.	105	0.18
2.	17	0.10
3.	60	0.12
4.	14	0.10
5.	26	0.10
6.	16	0.19
7.	12	0.10
8.	56	0.42
9.	105	0.22
10.	15	0.18
11.	21	0.28

Table 2 contd….

S No.	Serum estradiol (pg/ml)	Serum progesterone (ng/ml)
12.	90	0.40
13.	38	0.10
14.	13	0.12
15.	95	0.11
16.	220	0.15
17.	150	0.20
18.	13	0.16
19.	14	0.11
20.	10	0.11
21.	19	0.14
22.	310	0.15
23.	95	0.10
24.	22	0.20
25.	19	0.11
26.	13	0.12
27.	10	0.38
28.	23	0.38
29.	65	0.26
30.	95	0.10
31.	10	0.10
32.	11	0.10
33.	60	0.13
34.	60	0.10
35.	16	0.70
36.	10	0.19
37.	24	0.32
38.	15	0.14
39.	150	0.63

Table 3
Postmenopausal serum estradlol and serum progesterone levels in control subjects and cancer patients

Group	Serum estradiol (pg/ml)**	Serum progesterone (ng/ml)
Control subjects	18.66 ± 6.31 (12)	0.229 ± 0.01 (12)
Patients	54.56 ± 10.20 (39)+*	0.170 ± 0.01 (39)

+ Mean ± S.E. (No. of sample).
*$p < 0.05$.
**pg = 10^{12}g, ng = 10^{-9} g.

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