# EVALUATION OF SERUM COPPER LEVEL AS A DIAGNOSTIC AND PROGNOSTIC PARAMETER IN FEMALE GENITAL MALIGNANCY

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SUMMARY

**Serum copper levels were studied by sodium diethyldithiocarbamate method in 50 cases of malignant and 25 cases of benign neoplasms of female reproductive organs. Serum copper levels were also estimated in 25 healthy females who served as control. Mean serum copper levels in the three groups were 268.60 ± 62.30 μg/100 ml, 156.50 ± 18.35 μg/100 ml and 109.40 ± 16.80 μg/100 ml respectively. Serum copper levels were significantly higher in women with malignant neoplasms as compared to those found in benign neoplasms (< 0.001) and healthy controls (p < 0.001). In malignant group, difference in serum copper levels was further analysed according to the stage of disease. Levels were higher in advanced stages of both cervical and ovarian malignancies. Serum copper levels showed a significant decline after successful treatment (p < 0.025).**

## *INTRODUCTION*

Diagnosis of cancer arising from organs not easily accessible to clinical examination is usually late when the treatment becomes less effective. In gynaecological malignancies, a number of tumour markers have been identified like HCG, alphafetoprotein, carcinoembryonic antigen, lactic dehydrogenase aminotransferases, aminopeptidases etc. Circulating immune complexes have also been studied for their role as tumour markers (Bhatla et al, 1990) but none of these have proved satisfactory. Only a few studies have been done on serum copper levels in gynaecological malignancies (Brandes et al, 1983). Preliminary reports suggest that this may prove to be a useful adjunct in the evaluation of pelvic masses and in early diagnosis of gynaecological malignancy and its recurrence (O' Leary and Feldman, 1970; Brandes et al, 1983; Margalioth et al, 1987 etc.).

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*MATERIALS AND METHOD*

The present study was done on a total of one hundred women divided into three groups :

**Group A :** Fifty patients with malignant neoplasms of genital organs. The sites of origin of the malignancy are shown in Table I.

**Group B :** Twenty five patients with benign neoplasms of genital organ.

**Group C :** Twenty five healthy females (control group).

**Exclusion criteria**

Patients with acute or chronic infections, pregnancy, copper containing IUCD, liver disease, tuberculosis, recent myocardial infarction or history of oral contraceptive use were excluded from the study.

For serum copper analysis, 10ml of peripheral venous blood was drawn in plastic disposable syringe and collected in dry plastic test tubes, specially cleaned with dilute nitric acid. Serum was separated from each blood sample and serum copper analysis was done by diethyldithiocarbamate method (Ventura and King, 1951).

Samples for serum copper analysis were taken as per schedule given below :

**Group A :** These patients were further classified into following categories :

1. Patients treated with surgery alone : Samples were taken before surgery and 72 hours, 2 weeks and 3 months after surgery.
2. Patients treated with complication of surgery and chemotherapy or radiotherapy : Samples were collected before surgery and after completion of chemotherapy or radiotherapy.
3. Patients treated with radiotherapy alone : Samples were collected before and after completion of radiotherapy.

**Group B :** All cases were treated by surgery and samples were collected before surgery and 72 hours and 2 weeks after surgery.

**Group C :** Samples were collected once only.

*RESULTS*

The pretreatment copper levels and levels after treatment are shown in Table I & II.

There was significantly higher mean serum copper level in malignant cases as compared to that in benign tumour ($p < 0.001$) and control cases ($p < 0.001$). Mean serum copper level in benign cases was also significantly higher as compared to control group ($p < 0.001$).

Serum copper levels were analysed with reference to stage of disease in ovarian malignancy and carcinoma cervix. There was statistically significant hypercupremia in stage I malignant ovarian tumours as compared to benign ovarian tumour ($p < 0.001$). Though there was a constant rise in serum copper levels from stage I to stage III in cases of ovarian malignancy, statistically significant difference was seen only between stage I and stage III ($p < 0.001$).

Similarly, in cases of carcinoma cervix there was statistically significant rise in serum copper level in stage I as compared to the control group ($p < 0.001$) and in stage III as compared to stage I. In Group B, serum copper levels were significantly higher 72 hours after surgery as compared to pretreatment levels ($p < 0.001$). But levels fell significantly 2 weeks after surgery when compared to the preoperative levels ($p < 0.02$).

The serum copper levels in patients of group A treated by surgery fell significantly 3 months after surgery when compared to pretreatment levels ($p < 0.025$). Similarly in cases managed by radiotherapy alone or combination therapy, serum copper le

**Pretreatment Serum Copper levels according to the stage of the disease (FIGO)**

| | No. of patients (n*) | Serum copper in $\mu$g / 100 ml (Mean ± SD) | Serum copper levels in $\mu$g / 100 ml (Mean ± SD) Stage I | II | III | IV |
|---|---|---|---|---|---|---|
| **Group A : Total Cases** | 50 | 268.6 ± 62.3 | | | | |
| **Site of origin** | | | | | | |
| Ovary | 18 | 310.60 ± 67.38 | 269.85 ± 60.03 (n* = 7) | 283.66 ± 52.59 (n = 3) | 351.0 ± 52.06 (n = 8) | n = 0 |
| Cervix | 22 | 268.6 ± 62.3 | 230.4 ± 37.04 (n = 12) | 265.66 ± 41.17 (n = 5) | 306.0 ± 9.23 (n = 2) | (n = 0) |
| Body uterus** | 8 | 290.7 ± 54.6 | | | | |
| Vulva** | 2 | 254.45 ± 41.26 | | | | |
| **Group B** | | | | | | |
| Benign | 25 | 156.5 ± 18.35 | | | | |
| **Group C** | | | | | | |
| Control | 25 | 109.4 ± 16.80 | | | | |

* n = Number of cases.

** Malignancies of body uterus and vulva were not classified further because number of casees was small.

**Table II**

**Serum Copper levels after treatment**

| Modality of treatment | No. of cases | Serum copper levels in $\mu$g / 100 ml (Mean ± S. D.) | | | | |
|---|---|---|---|---|---|---|
| | | Pretreatment | 72 hours after surgery | 2 weeks after surgery | 3 months after surgery | on completion of chemo of Radiotherapy |
| Group A | 50 | | | | | |
| Surgery | 17 | 234.37 ± 53. 45 | 270.12 ± 60.94 | 205.12 ± 36.24 | 181.75 ± 65.09 | — |
| Radiotherapy | 8 | 280.0 ± 39.28 | — | — | — | 183.77 ± 19.30 |
| Surgery plus Chemo-or Radiotherapy | 25 | 286.48 ± 66.79 | — | — | — | 167.56 ± 13.33 |
| Group B | | | | | | |
| Surgery | 25 | 156.5 ± 18.35 | 175.84 ± 19.16 | 143.71 ± 15.64 | — | — |

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