



A Comparative Evaluation of serum Prolactin levels in pre-operative and post operative carcinoma breast patients

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Abstract

The involvement of prolactin is well established in mammary carcinoma in rodents. However the exact role of hormones such as oestrogen, prolactin and progesterone in human breast cancer still remains elusive. The present study was undertaken to compare the preoperative and postoperative serum prolactin levels in patients of carcinoma breast coming to the department of Surgery, Guru Nanak Dev Hospital attached to Govt. Medical College, Amritsar.. Serum prolactin levels showed a statistically significant elevation in premenopausal as well as in postmenopausal patients of carcinoma breast as compared to control group. The prolactin levels were raised two days after and one month after surgery upon breast. The elevation was more marked in premenopausal patients as compared to postmenopausal patients of carcinoma breast.

Keywords: Carcinoma breast; Prolactin

Introduction

Prolactin is a protein hormone containing 198 amino acids in a single polypeptide chain containing three intrachain disulphide bonds. It is secreted by acidophilic cells in the anterior pituitary. Normally it is involved in the initiation and maintenance of lactation in mammals. Excessive levels can lead to galactorrhoea in women and gynaecomastia in men. Normal serum prolactin levels in adult females and males are 5-50 ng/ml and less than 25ng/ml respectively.

The diseases of breast, pituitary, hypothalamus can cause hyperprolactinemia¹. It is unequivocal that prolactin is an influential hormone in rodent mammary tumorigenesis^{2,3}. It has also been reported to be increased in cases of human carcinoma breast^{4,5}. The present study was undertaken to study the levels of serum prolactin in cases of carcinoma breast and the effect of mastectomy on its levels.

Materials and Methods

The patients were divided into two groups:

1. Study group comprising of ninety patients of carcinoma breast who underwent surgery
2. Control group comprising of thirty-five patients of comparative age group and socioeconomic status

who underwent surgery for reasons other than carcinoma breast.

In all patients, sample for serum prolactin was taken 2 days before surgery. Similarly two more blood samples were taken 2 days and 1 month after surgery. Serum prolactin levels were estimated by ELISA (Enzyme Linked ImmunoSorbant Assay) method for quantitative determination of prolactin by immunodiagnostic kit.

Observations

Table I: Shows menstrual status

Menopausal status	Study Group		Control Group		Total
	No. of cases	% age	No. of cases	% age	
Premenopausal	43	47.8	15	42.9	58
Postmenopausal	47	52.2	20	57.1	67
Total	90	100	35	100	125

The above table shows that more number of carcinoma breast patients were in the post menopausal group.

Table II : Shows age group

Age Group (yrs)	Study Group		Control Group	
	No of cases	% age	No of cases	% age
21-30	1	1.1	4	11.4
31-40	22	24.4	10	28.6
41-50	31	34.4	8	22.9
51-60	26	28.9	11	31.4
>60	10	11.11	2	5.7

The above table reveals that maximum number of carcinoma breast patients were in the fourth and fifth decades of their life.

Table III : Shows age and duration.

	Study Group	Control Group
Average age at menarche	13.3±1.1	14.2±1.4
Average duration of lactation	14.0±6.6	16.3±6.2
Average age at first child birth	21.9±3.4	20.4±2.5

The average age at menarche in the study group was 13.3 years as compared to 14.2 years in the control group as shown in Table III. So the patients of carcinoma breast had an earlier menarche in comparison to controls. The Table shows that average period of lactation in patients with breast carcinoma was 14.0 months which

was much lower than average period of lactation of 16.3 months among the controls. Average age at first childbirth was marginally higher in carcinoma breast patients. Also carcinoma breast was found to be more common in postmenopausal women as compared to the premenopausal women.

Table IV: Stage of the Tumor at time of presentation

Stage	No of cases	%age
Stage I	2	2.2
Stage II	48	53.3
Stage III	34	37.8
Stage IV	0	0
Could not be assessed	6	6.7

As is evident from table IV, majority of patients coming to us were in Stage II and Stage III (93.3%). Stage IV cases were excluded from this

study. All cases of Stage II disease underwent modified radical mastectomy while cases of Stage III disease were submitted to simple mastectomy.

Table V: depicting Prolactin levels

Serum prolactin levels	Study group			Control Group		
	Preoperative	Postoperative		Preoperative	Postoperative	
		2 days	1 month		2 days	1 month
Range(ng/ml)	18.2-88.6	31.6-139.4	32.0- 110 .5	5.2-16.2	3.1-20.1	5.2-18.3
Mean(ng/ml)	40.65± 16.71	61.27± 22.69	60.62± 18 .43	7.91-3.64	7 .84± 4.73	8.16± 3.92
t-value		t=4,05	t=4.44		t=0 .037	t=0.148
Statistical significance		p<0.01 Significant	p<0.01 Significant		Not Significant	Not Significant

As is evident from table V, the preoperative mean serum prolactin levels in study group was 40.65ng/ml with a standard deviation of 16.71 ng/ml as compared to control value of 7.91ng/ml with standard deviation of 3.64ng/ml. The mean serum prolactin level 2 days after surgery was

61.27 with a standard deviation of 22.69 and the mean value after 1 month was 60.62 with a standard deviation of 18.43. Similar values in control patients were 7.84+4.73 and 8.16+3.92 respectively.

Table VI: Various authors depicting prolactin levels in different groups

Authors	Study group	Control group	Statistical significance
Boyn et al (1973)	1,411±0.449 (mamp/ml)	1.171+0.37 (mamp/ml)	Insignificant
Rolandi et al (1974)	23.8±7 .15(ng/ml)	18,31+6,10(ng/ml)	Significant rise
Rose and Pruitt (1981)	4.9+2.2(µg/ml)	13.5+5.9(ng/ml)	Significant rise
I A Bani et al (1986)	1112±278	409+81	Significant rise
Bhatavadekar (1990)	40 .59+6.57 (ng/ml)	5.38+0,71(ng/ml)	Significant rise
Present Study(1998)	40.65+16 .71 (ng/ml)	7.91+3.64 (ng/ml)	Significant rise t=6.12

The present study compares serum levels of prolactin in cancer breast patients preoperatively and postoperatively as compared to control group levels.As is evident form table VI, the

preoperative serum levels of prolactin in study group were much higher than those of control group and were statistically significant.

Table VII: Various authors depicting prolactin levels in the preoperative and postoperative period

Authors	Preoperative (ng/ml)	Postoperative	Statistical Significance
Herman et al (1981)	7.1±1.31	46.8	Significant
Rose and Pruitt (1981)	13.5±15.9	27.2±31.2	Significant
Ulang et al (1986)	9.14±9.85	17.75±15.4	Significant
Present Study(1998)	40.65±16.71	32.0-110.5 (at 1 months)	Significant

The above table shows that a marked statistically significant elevation of serum prolactin was noted in all patients of cancer breast after mastectomy.

Table VIII: Showing Prolactin levels in various groups

Prolactin levels	Control Group	Premenopausal	Postmenopausal
Mean (ng/ml)	7.91 + 3.64	49.06±20.44	34.24±9.58
P value		Significant	Significant

The above table shows that in the present study mean serum rise in serum prolactin was more in premenopausal patients of carcinoma breast i.e. 49.06 as compared to postmenopausal patients i.e.

34.24 ng/ml. However in both the groups mean levels were, much higher as compared to the serum prolactin levels in the control group i.e. 7.9ng/ml and are statistically significant

Table IX: showing Prolactin levels in different groups

Serum prolactin levels	Study group			Control group		
	Pre-operative	Post operative		Pre operative	Post operative	
		2 days	1 month		2 days	1 month
Range (ng/ml)	18.2-88.6	31.6-139.4	32.0-110.5	5.2-16.6	3.1-20.1	5.2-18.3
Mean (ng/ml)	40.65±16.71	61.27-22.69	60.62±18.43	7.91±3.64	7.84±4.73	8.16±3.92
t-value		4.05	4.44		0.037	0.148
Statistical significance		<0.01 (significant)	<0.01 (significant)		Not significant t	Not significant t

The mean value of prolactin levels in carcinoma breast patients showed a marked elevation when analyzed two days and one month after surgery as compared to pre-operative levels. While pre-operatively the mean value of prolactin level was 40.65 ng/ml, the post operative mean value was 61.27 ng/ml two days after surgery and 60.62

ng/ml one month after surgery. Both of these postoperative prolactin level elevations were statistically significant. However, as is evident from the above table, the control group patients did not have any significant rise of prolactin levels both 2 days and 1 month after surgery.

Discussion

The preoperative serum levels of prolactin in study group were much higher than those of control group and were statistically significant as shown in Table VI. Similar observations were made by the Rolandi et al 4. Barni et al reported that the rise in preoperative serum prolactin levels was more in cases of poorly differentiated disease and thus had a prognostic value⁵. Bhatavadekar also found that increased prolactin levels had a poor prognostic value⁶. Faupel-Badger et al found that prolactin stimulates breast cancer cell proliferation, migration and survival via binding to the cell surface prolactin receptor.¹⁵

In another observation a marked statistically significant elevation of serum prolactin was noted in all patients of cancer breast after mastectomy as compared to the control group. Similarly, Herman et al noted that all the cancer breast patients included in their study had elevated levels of prolactin in the first five days after surgery⁷. They implicated a hypothesis of neural mechanisms in their causation of hyperprolactinemia.

Rose and Pruitt and Wang et al also reported a statistically significant rise in postoperative levels of serum prolactin^{8,9}.

Similar postoperative elevations have been reported in other studies. Lissini et al studied serum prolactin levels in patients of carcinoma breast upto five months after surgery¹⁰. In a large proportion of cases, they found elevated levels of prolactin even at three months after surgery and found that this forms an independent favourable prognostic factor. They hypothesized that this rise was related to host neuroendocrine response rather than to tumor biological characteristics.

The present study observed that mean serum rise in serum prolactin was more in premenopausal patients of carcinoma breast as compared to postmenopausal patients. However in both the groups mean levels were much higher as compared to the serum prolactin levels in the control group and were statistically significant. Faupel-Badger¹⁴ observed in their study

that prolactin levels were associated with nulliparity in premenopausal ($p = 0.05$) but not in post menopausal women and demonstrated that prolactin levels were higher among premenopausal nulliparus as compared to parous women.

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Bani et al also reported a significant rise of plasma prolactin in cases of cancer breast which were more marked in premenopausal patients as compared to the postmenopausal patients but was insignificant in postmenopausal women¹¹ whereas Bhatavadekar et al found more abnormalities in postmenopausal women⁶. Susan E. Hankinson suggest that higher plasma prolactin levels are associated with an increased risk of breast cancer in postmenopausal women¹². Olsson showed plasma prolactin level measured to be high after mastectomy in premenopausal women¹³.

Conclusion

It was observed that fourth and fifth decades of life are most susceptible for development of breast cancer. The study showed a significant increase in serum prolactin level in carcinoma breast patients as compared to patients with benign breast disease. This study indicates that there is a significant elevation in serum prolactin level post operatively as compared to pre operative level in carcinoma breast patients. Moreover this rise of serum prolactin level was more marked in premenopausal patients as compared to postmenopausal patients.

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