

Relationship between the levels of Serum Thyroid Hormones and the Risk of Breast Cancer

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Abstract:

Breast cancer is still one of the leading causes of cancer death in women, but there has been a sustained decline in mortality rates over the last decades the relationship between breast cancer and thyroid diseases is controversial many works have been done in past also. The relation between autoimmune and non-autoimmune thyroid diseases has been investigated in patients with breast cancer and age-matched control individuals without breast or thyroid disease. Determination of serum thyroid hormone and antibody levels was done in 100 breast cancer patients and 75 control individuals. The mean values for thyroid hormones and anti-thyroid peroxidase antibodies were significantly higher in breast cancer patients than in control individuals. Our results indicate an increased prevalence of autoimmune and non-autoimmune thyroid diseases in breast cancer patients.

Keywords: breast, cancer, autoimmune thyroid diseases.

1. Introduction

Breast cancer is a hormone-dependent neoplasm. It is the most common malignancy in women in western countries and accounts for 18.4% of all cancers in female patients (Sidransky d.1991). Qualitative changes in the lifestyle of women in developed countries that can influence risk factors for breast cancer, such as age at menarche, menopause, or first pregnancy, may partially explain this phenomenon (Sidransky 1992). Conflicting results regarding the clinical correlation between breast cancer and thyroid diseases have been reported in the literature (Mittra I., 1976 and Shering sg, 1996). Many studies showed that thyroid diseases are common among women with breast cancer whereas other reports did not confirm such an association of breast cancer with thyroid diseases (Maruchi n, 1976, Lemmarie m, 1986, Moossa ar, 1973, Kurland It, 1976 and Anker gb, 1998). The objective of this study was to determine the relationship between breast cancer and autoimmune thyroid diseases (AITDS). Some authors have reported a higher prevalence of aitsd among breast cancer patients than in age-matched control individuals (Gogas j, 2001, Myhil j, 1966 and Giani c, 1986). The aim of the present study was to determine the prevalence of thyroid diseases in patients with breast cancer as compared with that in the general female population.

2. Materials and methods

2.1 Patient selection

Study was carried out in Sher-i-Kashmir University of Agricultural Sciences and Technology Srinagar in association with Govt. Medical College Srinagar. The study included 100 patients with Breast cancer and 75 controls (healthy volunteers). Breast cancer patients were 38–80 years old (median age 63 years) and were without any known thyroid disease. All patients were studied before any radio or chemo therapy.

2.2 Study included the following examinations

Serum free Tri-iodothyronine (T₃) and free thyroxine (T₄) levels were determined in both patients and controls based on a solid-phase I¹²⁵ radioimmunoassay designed for the quantitative measurement of free T₃ and free T₄ levels in serum using coat-a-count kit containing radioactive I¹²⁵-T₃ or T₄ analogue. Also, serum thyroid-stimulating hormone (TSH) levels were measured using a Immunoradiometric assay designed for Quantitative Measurement of TSH in serum using coat-a-count kit containing radioactive I¹²⁵-polyclonal anti-TSH. The normal ranges were 2.2–6.8 pmol/l (1.4–4.4 pg/ml) for free

T₃, 0.8–2.0 ng/dl for free T₄ and 0.3–5.0 μIU/ml for TSH. All patients underwent serological determination of thyroid autoantibodies based on a direct anti-TPO radioimmunoassay kit for quantitative determination of anti-TPO autoantibodies (immunotech). Autoantibodies specific for thyroglobulin were measured using a quantitative indirect enzyme immunoassay based on the sandwich method (antithyroglobulin immunoradiometric assay kit; immunotech). The normal ranges were 0–60 IU/ml for antithyroglobulin antibodies and 0–20 IU/ml for anti-TPO antibodies. Those women without any breast or thyroid disease were the control group.

3. Results:

Evaluation of thyroid function was based on serum thyroid hormones. The mean values for serum thyroid hormones were 7.25±0.75 pmol/l for free t₃, 2.93±0.57 ng/dl for free t₄ and 4.12±1.40 μIU/ml for TSH in breast cancer patients, and 3.42±0.91 pmol/l, 1.39±0.21 ng/dl and 1.39±0.79 μIU/ml respectively in the control group. The mean values for serum thyroid autoantibodies were 104.57±19.39- iu/ml for anti-TPO antibodies in breast cancer patients, and 24.81±5.16 IU/ml and, in the control group (table-1).

Thus, the mean value for thyroid hormones and anti-TPO antibodies was higher in breast cancer patients than in the control group (p=0.030) and using statistical analysis it has been proposed that the presence of thyroid abnormalities may influence breast cancer progression.

4. Discussion

The coincidence of thyroid disease and breast cancer has long been a subject of debate. Geographical variations in the incidence of breast cancer have been attributed to differences in dietary iodine intake, and an effect of iodine on the breast has been postulated (Mittra I., 1976). The possible interactions between thyroid gland and breast tissue are based on the common property of the mammary and thyroid epithelial cell to concentrate iodine by a membrane active transport mechanism (Giani c, 1986) as well as on the presence of TSH receptors in fatty tissue, which is abundant in mammary gland (Davies tf. 1994). Additionally, some endocrine stimuli identified in thyroid products that exert a simultaneous action on the breast and the various thyroid antibodies, which could also interact with receptors on breast tumours, have been postulated to be responsible for the coincidence of mammary and thyroid gland disorders (Ron e., 1984 and Dumont je, 1991). The present study found high prevalence of thyroid hormones and autoimmune thyroiditis, in breast cancer patients. With the use of specific immunoassays for TPO and thyroglobulin antibodies, an increased level of TPO has been demonstrated in breast cancer. It has been proposed that the presence of thyroid abnormalities may influence breast cancer progression (Smyth,1988). A recent report suggested a better prognosis for breast cancer among patients with increased levels of TPO (Smyth,1988). It has been proposed that the immune response might be directed both by tumour and by thyroid tissue, (Smyth ppa, 2000), or that the tumour and thyroid tissue share common properties, as they both express TPO and the sodium iodide symporter gene (Spitzweg c,1998 and Kilbane mta, 1998),

5. Conclusion

In this paper, we have studied thyroid autoantibody levels and thyroid function tests in breast cancer patients and controls. Abnormal thyroid gland characteristics were revealed in the breast cancer patients compared with the control group. There was a significant difference between the groups in terms of TPo antibody levels. These results indicate a significant association between breast cancer and thyroid disorders

6. Abbreviations

T₃ = triiodothyronine; AITD = autoimmune thyroid disease; ER = Estrogen receptor; T₄ = Thyroxine; TSH = Thyroid-Stimulating Hormone; TPO = Thyroid Peroxidase.

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Table 1
Serum thyroid hormone and antibody levels

	Patients	Control	P
Free t3 (pmol/l)	7.25 ±0.75	3.42 ±0.91	0.48
Free t4 (ng/dl)	2.93 ±0.57	1.39 ±0.21	0.51
Tsh (μIU/ml)	4.12 ±1.40	1.39 ±0.79	0.27
Anti-TPO antibodies (iu/ml)	104.57 ±19.39	24.81 ±5.16	0.030

T3, triiodothyronine; T4, thyroxine; TPO, thyroid peroxidase; TSH , thyroid-stimulating hormone.

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