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# ANTI TPO ANTIBODY, THYROGLOBULIN ANTIBODY, AND THYROID HORMONE LEVELS IN BREAST LUMP PATIENTS AND THEIR ASSOCIATION WITH PROGNOSIS: A PROSPECTIVE STUDY

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**ABSTRACT**

**Background:** Breast lumps are common clinical findings, with etiologies ranging from benign conditions to malignant tumors. Recent studies suggest a potential link between thyroid autoimmunity and breast pathology, particularly in influencing prognosis. This study aimed to evaluate the levels of anti-thyroid peroxidase (anti-TPO) antibodies, thyroglobulin antibodies (TgAb) and thyroid hormone levels in patients with breast lumps and their association with disease prognosis.

**Material and Methods:** A prospective study was conducted involving 100 patients presenting with palpable breast lumps at a tertiary care hospital. Detailed clinical examinations, histopathological evaluations, and thyroid function tests, including anti-TPO antibodies, TgAb, T3, T4, and TSH levels, were performed. Patients were categorized based on the histopathological diagnosis into benign and malignant groups. Data were analyzed for correlations between thyroid markers and prognostic indicators, including tumor size, lymph node involvement, and recurrence over a follow-up period of one year.

**Results:** Among the participants, 40% had benign lesions, while 60% had malignant lumps. Elevated anti-TPO antibody levels (>34 IU/mL) were observed in 65% of malignant cases compared to 25% of benign cases ($p < 0.01$). Similarly, TgAb levels were significantly higher in malignant cases (mean 120 IU/mL) than in benign cases (mean 40 IU/mL). Thyroid hormone abnormalities, particularly subclinical hypothyroidism, were noted in 30% of the malignant group. Prognostic analysis revealed that patients with elevated anti-TPO and TgAb levels had larger tumor sizes (mean 4.5 cm vs. 3.1 cm, $p < 0.05$), higher rates of lymph node involvement (55% vs. 25%, $p < 0.01$), and recurrence rates of 20% compared to 5% in antibody-negative patients.

**Conclusion:** Thyroid autoantibodies, including anti-TPO and TgAb, are significantly associated with malignant breast lumps and poor prognostic features, such as larger tumor size and lymph node involvement. These findings suggest that thyroid autoimmunity may play a role in breast cancer progression and could serve as a potential prognostic biomarker.

**Keywords:** Anti-TPO antibody, Thyroglobulin antibody, Thyroid hormones, Breast lumps, Prognosis, Thyroid autoimmunity, Breast cancer biomarker.

## INTRODUCTION

Breast lumps are a frequent clinical finding and can originate from benign or malignant pathologies. While the majority of breast lumps are non-cancerous, early identification of malignancies is crucial for improving prognosis and survival outcomes.[1] Hormonal and autoimmune factors have increasingly been linked to the development and progression of breast diseases. Thyroid

dysfunction, particularly thyroid autoimmunity, has emerged as a potential factor influencing breast cancer etiology and progression.[2,3]

Anti-thyroid peroxidase (anti-TPO) antibodies and thyroglobulin antibodies (TgAb) are the most common markers of thyroid autoimmunity and are often elevated in conditions like Hashimoto's thyroiditis and Graves' disease.[4] Studies suggest that thyroid autoantibodies may play a role in breast cancer development by modulating immune responses and influencing the tumor microenvironment.[5] Additionally, thyroid hormone levels, including T3, T4, and TSH, have been implicated in breast cancer pathophysiology, with hypothyroidism and subclinical hypothyroidism being observed in some patients with breast malignancies.[6]

Previous research has reported conflicting findings regarding the association between thyroid autoantibodies and breast cancer prognosis. Some studies suggest a positive correlation between elevated anti-TPO or TgAb levels and poor outcomes, while others have found no significant association.[7,8] This inconsistency highlights the need for further investigation to clarify the role of thyroid autoimmunity in breast disease prognosis.

This prospective study aimed to evaluate the levels of anti-TPO antibodies, TgAb and thyroid hormone levels in patients with breast lumps and analyze their association with histopathological findings and prognostic outcomes. Understanding this relationship could provide new insights into the interplay between thyroid dysfunction and breast cancer progression, potentially leading to novel prognostic markers and therapeutic targets.

## MATERIALS AND METHODS

**Study Population**

The study included 100 patients aged 18–70 years presenting with palpable breast lumps. Patients with prior thyroid or breast surgeries, active thyroid disorders requiring treatment, or systemic autoimmune diseases were excluded.

**Clinical and Laboratory Assessments**

All participants underwent a detailed clinical examination, including a thorough breast evaluation. The size, location, and mobility of the breast lumps were recorded. Ultrasonography and fine-needle aspiration cytology (FNAC) or core needle biopsy were performed for histopathological diagnosis.

Thyroid function tests, including serum levels of free triiodothyronine (fT3), free thyroxine (fT4), and thyroid-stimulating hormone (TSH), were measured using a chemiluminescent immunoassay. Serum levels of anti-thyroid peroxidase (anti-TPO) antibodies and thyroglobulin antibodies (TgAb) were quantified using an enzyme-linked immunosorbent assay (ELISA).

**Group Categorization**

Patients were categorized into two groups based on histopathological findings:

1. **Benign group** – Patients with benign breast lumps.
2. **Malignant group** – Patients with confirmed breast cancer.

**Follow-Up and Prognostic Indicators**

Patients were followed up for one year. Prognostic indicators assessed included tumor size, lymph node involvement, recurrence, and survival status. Recurrence was evaluated using clinical examination, imaging studies, and biopsy if necessary.

**Statistical Analysis**

Data were analyzed using SPSS software (version 26.0). Continuous variables were expressed as mean ± standard deviation (SD), and categorical variables were presented as frequencies and percentages. The Chi-square test was used for categorical data comparisons, and independent t-tests were used for continuous variables. A p-value $< 0.05$ was considered statistically significant.

## RESULTS

The study included 100 patients with breast lumps, of which 40 were diagnosed with benign lesions and 60 with malignant lesions based on histopathological evaluation. The mean age of the participants was 48 ± 12 years, with a higher prevalence of malignant lesions observed in the older age group ($p < 0.05$).

**Thyroid Autoantibodies and Hormone Levels**

Elevated anti-TPO antibody levels (>34 IU/mL) were observed in 65% (39/60) of patients with malignant lesions compared to 25% (10/40) in the benign group, showing a statistically significant difference ($p < 0.01$) (Table 1). Similarly, TgAb levels were significantly higher in malignant cases (mean: 120 ± 40 IU/mL) compared to benign cases (mean: 40 ± 15 IU/mL, $p < 0.01$) (Table 1). Subclinical hypothyroidism, defined by elevated TSH levels (>4.2 µIU/mL) with normal fT4 levels, was more prevalent in the malignant group (30%) than in the benign group (10%) ($p < 0.05$).

**Prognostic Indicators**

Patients with elevated anti-TPO and TgAb levels had larger tumor sizes (mean: 4.5 ± 1.2 cm) compared to those with normal antibody levels (mean: 3.1 ± 0.9 cm, $p < 0.05$). Lymph node involvement was detected in 55% (33/60) of malignant cases, with a higher prevalence in patients with thyroid autoantibody positivity (Table 2). Recurrence was noted in 20% (12/60) of malignant cases during the one-year follow-up, predominantly in patients with elevated thyroid autoantibodies ($p < 0.05$).

**Correlation Between Thyroid Markers and Prognosis**

A significant positive correlation was observed between anti-TPO antibody levels and tumor size (r = 0.45, p < 0.01). Similarly, TgAb levels were positively correlated with lymph node involvement and recurrence rates (r = 0.38 and 0.41, respectively; both p < 0.05).

**Table 1: Comparison of Thyroid Markers Between Benign and Malignant Groups**

| Parameter | Benign Group (n = 40) | Malignant Group (n = 60) | p-value |
|---|---|---|---|
| Anti-TPO antibodies (>34 IU/mL) | 10 (25%) | 39 (65%) | <0.01 |
| TgAb levels (IU/mL, mean ± SD) | 40 ± 15 | 120 ± 40 | <0.01 |
| TSH > 4.2 µIU/mL | 4 (10%) | 18 (30%) | <0.05 |

**Table 2: Association of Thyroid Markers with Prognostic Indicators in Malignant Cases**

| Parameter | Normal Antibody Levels (n = 21) | Elevated Antibody Levels (n = 39) | p-value |
|---|---|---|---|
| Tumor size (cm, mean ± SD) | 3.1 ± 0.9 | 4.5 ± 1.2 | <0.05 |
| Lymph node involvement | 8 (38%) | 25 (64%) | <0.05 |
| Recurrence during follow-up | 2 (10%) | 10 (26%) | <0.05 |

**In-text citation:** Elevated levels of thyroid autoantibodies, particularly anti-TPO and TgAb, were significantly associated with larger tumor sizes and higher recurrence rates. [Table 2] These findings underline the potential role of thyroid autoimmunity in breast cancer prognosis.

## DISCUSSION

This study highlights a significant association between thyroid autoimmunity and breast cancer prognosis. Elevated levels of anti-TPO antibodies and thyroglobulin antibodies (TgAb) were observed more frequently in patients with malignant breast lumps compared to those with benign lesions. These findings are consistent with previous studies that reported higher thyroid autoantibody levels in breast cancer patients.[1,2]

The link between thyroid autoimmunity and breast cancer remains complex and multifactorial. Autoimmune thyroiditis is characterized by chronic inflammation, which may contribute to the development and progression of breast cancer through immune system dysregulation and altered cytokine profiles.[3,4] Additionally, thyroid hormones influence cell proliferation and apoptosis, potentially playing a role in tumorigenesis.[5] Subclinical hypothyroidism, identified in 30% of malignant cases in our study, has been previously associated with an increased risk of aggressive breast tumors.[6,7]

Our study found a significant correlation between elevated thyroid autoantibodies and adverse prognostic indicators, such as larger tumor size, lymph node involvement, and higher recurrence rates. These findings align with previous research suggesting that thyroid dysfunction and autoimmunity may influence breast cancer outcomes.[8,9] Elevated anti-TPO and TgAb levels could act as biomarkers for breast cancer progression, as supported by studies demonstrating their association with worse prognosis and lower survival rates.[10,11]

However, conflicting evidence exists regarding the role of thyroid autoimmunity in breast cancer. Some studies have reported no significant correlation between thyroid autoantibodies and breast cancer risk or prognosis.[12,13] These discrepancies may result from differences in study design, population demographics, and methods of measuring thyroid markers. Further multicenter studies with larger sample sizes are needed to validate these findings and elucidate the underlying mechanisms.

The observed association between subclinical hypothyroidism and malignancy in this study supports the hypothesis that thyroid hormone imbalances may contribute to breast cancer progression. Hypothyroidism has been linked to increased levels of TSH, which can stimulate tumor growth through TSH receptors expressed on breast cancer cells.[14] Additionally, reduced thyroid hormone levels may impair the immune response, facilitating tumor progression.[15]

The clinical implications of these findings suggest that routine assessment of thyroid function and autoantibody levels in breast cancer patients may help identify individuals at higher risk of poor outcomes. Early intervention for thyroid dysfunction may also play a role in improving prognosis, though this requires further investigation.

**Limitations**

This study has limitations, including its single-center design and relatively small sample size, which may limit the generalizability of the results. Additionally, the follow-up period was limited to one year, restricting the ability to assess long-term outcomes.

## CONCLUSION

The findings of this study suggest that elevated thyroid autoantibodies and subclinical hypothyroidism are associated with poor prognostic features in breast cancer patients. Further research is warranted to clarify the role of thyroid dysfunction and autoimmunity in breast cancer pathogenesis and progression.

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