# A COMPARATIVE STUDY OF THYROID PROFILES OF BREAST CANCER PATIENTS AND APPARENTLY HEALTHY WOMEN

**H.M.K. Akalanka*[1], K.G. Amarathunge[1], S. Ekanayake[1], K. Samarasinghe[2]**

*[1]Department of Biochemistry and [2]Department of Pathology, Faculty of Medical Sciences, University of Sri Jayawardenapura*

**Corresponding author (email: kasuniakalanka@gmail.com)*

**Introduction**

**Thyroid hormone receptors can influence both breast cell differentiation and cancer cell proliferation. Oestrogen like effects of thyroid hormones is suspected to be impacting breast cancer (BC) development. Several studies have revealed the association of thyroid hormones and breast cancer. However, the impact of thyroid hormones on BC development is reported with inconclusive results.**

**Thyroid diseases and serum T3 and T4 concentrations are reported to be higher among BC patients than apparently healthy individuals. Twenty-five percent (25%) of women with BC are reported to have a history of thyroid diseases and subclinical hypothyroidism is reported to be statistically significantly associated with BC incidence. The mean plasma TSH levels are also reported to be higher among women with breast cancer than healthy women, however the increase is reported to be statistically significant only with the advanced disease.**

**In contrast some studies reveal non altered thyroid profiles in BC women. Thus a higher incidence of thyroid disorders such as hypothyroidism, hyperthyroidism or autoimmune thyroiditis in breast cancer patients or patients with benign breast tumours is not reported. A negative correlation between TSH and T3 in early BC is reported but not in advanced BC.**

**Hypothyroidism and low normal free T4 are related with an increased risk of BC in postmenopausal women. As data on a comparative study on thyroid profiles of Sri Lankan breast cancer patients is not reported this study was designed to analyze the thyroid profile of BC patients and to compare with healthy females. The objectives of this study were to assess serum TSH, T3 and T4 concentrations of newly diagnosed BC patients and to compare with age matched healthy females.**

**Methodology**

**Newly diagnosed BC patients (n=155) those who have not undergone treatments were selected from National Cancer Institute, Maharagama. Age matched apparently healthy females (n=75) were selected for the comparative study. Using an interviewer administered questionnaire, data on history of thyroid related diseases was collected.**

**Thyroid profile (T3, T4 and TSH) was analyzed using immune turbidometric measurements using mini VIDAS immune analyzer. Statistical analysis was done using SPSS version 16. Ethical approval for the study was obtained from Ethics Review**

**Committee of Faculty of Medical Sciences, University of Sri Jayewardenepura (Approval numbers 651/12, 14/28).**

**Results and Discussion**

**Among the BC patients, 13% (n=20) were affected with thyroid disorders and were excluded from the study. The mean TSH, T3 and T4 concentrations of breast cancer and healthy women is illustrated in Table 01.**

**Table 1. Average thyroid hormone concentrations of BC and healthy women**

| | Breast Cancer Patients n= 135 | Healthy women n= 75 | Reference range |
|---|---|---|---|
| TSH (mIU/L) | 2.42±1.88 | 3.19± 4.9 | 0.3 - 5.0 |
| T3 (pg/mL) | 2.61±0.41 | 2.35± 0.33 | 2.08-6.74 |
| T4 (ng/dL) | 1.16 ± 0.25 | 0.99 ± 0.25 | 0.8 -2.3 |

**TSH, T3 and T4 concentrations of women with breast cancer and healthy, were not significantly different according to the menopausal status ($p>0.05$). Mean serum TSH of apparently healthy individuals was higher compared to BC women but was insignificant ($p>0.05$). However, serum T3 and T4 concentrations of BC patients were significantly higher ($p<0.05$) when compared to healthy females. T3 of BC and healthy women studied via ROC curve showed 68% ($p=0.001$, CI=0.587-0.762) of area under the curve with a T3 cutoff value of 2.23 (pg/mL) with 79% sensitivity and 48% specificity. T4 cutoff value was 0.92 with 44% sensitivity and 83% specificity.**

**Among the study sample, women having T3 and T4 concentrations above these cutoff values had 3.28 (CI= 1.59-6.78) and 3.73 (CI=1.79-7.77) odds of having breast carcinoma respectively.**

**Subclinical hypothyroidism was observed among 14% of BC patients and 7% of healthy females. Among healthy females T3 concentration significantly positively associated ($r= 0.35$, $p<0.05$) with T4.**

**A significant association between any thyroid hormone was not observed among BC patients ($p>0.05$). However, TSH showed a non-significant negative association with T3 and T4 among both the groups.**

**Conclusions and recommendations**

**Among the studied breast cancer women, T3 and T4 concentrations were significantly higher compared to age matched healthy women. Thus, the involvement of thyroid hormones in BC cannot be undermined. Incidence of subclinical hypothyroidism is twice as high in BC women compared to healthy women. Thus the findings are against Ditsch *et al*., 2010 but in agreement with Saraiva *et al*., 2005.**

**Further studies with larger study groups and long duration follow-ups are recommended in deriving conclusions on the impact of thyroid hormones in breast cancer development.**

**References**

**Conde, I. et al., (2006). Influence of thyroid hormone receptors on breast cancer cell proliferation. Annals of oncology: official journal of the European Society for Medical Oncology / ESMO, 17(1), pp.60–4.**

**Ditsch, N. *et al.*, (2010). Thyroid Function in Breast Cancer Patients. anticancer research, 1718(30), pp.1713–1717.**

**Hercbergs, A.H., Ashur-Fabian, O. & Garfield, D., (2010). Thyroid hormones and cancer: clinical studies of hypothyroidism in oncology. Current opinion in endocrinology, diabetes, and obesity, 17(5), pp.432–6.**

**Kuijpens, J.L.P. *et al.*, (2005). Hypothyroidism might be related to breast cancer in post-menopausal women. Thyroid: official journal of the American Thyroid Association, 15(11), pp.1253–1259.**

**Rose, D.P. & Davis, T.E., (1979). Plasma triiodothyronine concentrations in breast cancer. Cancer, 43(4), pp.1434–1438.**

**Saraiva, P.P. et al., (2005). Profile of thyroid hormones in breast cancer patients. Brazilian Journal of Medical and Biological Research, 38, pp.761–765.**