



## Diagnosis of Lymphocytic Thyroiditis Based on Grey Scale Evaluation in Correlation with Ultrasound Guided Fine Needle Aspiration Cytology

Authors

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### Abstract

**Aim:** The aim of study was to validate the grey scale sonographic findings in lymphocytic thyroiditis using fine needle aspiration cytology which is taken as reference standard.

**Methodology:** 89 patients with diffuse neck swelling of the age group 18-80 years who came for sonographic examination of thyroid in the Department of Radiodiagnosis, in Medical college Alappuzha were included in the study, for a period of one year. Grey scale evaluation was done followed by ultrasound guided fine needle aspiration cytology.

**Study Design:** Descriptive study, with diagnostic test evaluation.

**Results:** The results indicated that there can be sonographically normal forms of thyroiditis, and also it not associated with thyroid enlargement always. The reduction in echogenicity correlated with reduction in thyroid follicles, which is due to lymphocytic infiltration in lymphocytic thyroiditis. A combination of grayscale parameters, presence of micronodules, fibrotic septations and absence of calcification can diagnose thyroiditis with sensitivity, specificity, positive predictive value, negative predictive value and accuracy of 85%, 70%, 88%, 64% and 80% respectively. New cut off value of 1.2 cm, for anteroposterior diameter of thyroid is obtained from the receiver operator characteristic curve which can diagnose lymphocytic thyroiditis with 70% sensitivity and 60% specificity.

**Keywords:** Lymphocytic Thyroiditis, ultrasound thyroid.

### Introduction

Lymphocytic thyroiditis or autoimmune thyroiditis<sup>(1)</sup> is the most common cause of subclinical and overt hypothyroidism in an iodine sufficient region. Alappuzha, the coastal terrain of Kerala constitutes the zonal predilection for lymphocytic or autoimmune thyroiditis.

The importance of detection of lymphocytic thyroiditis is, because of its increased association with thyroid malignancies like papillary carcinoma and lymphoma. And it is reassuring to

know that prognosis is better when papillary carcinoma is associated with lymphocytic thyroiditis. Lymphocytic thyroiditis, is an autoimmune inflammatory disease caused by activation of CD4 helper T- lymphocytes specific for thyroid antigen and characterized by lymphocyte infiltration, fibrosis, and gradual destruction of the thyroid gland. This study is an attempt to characterize and validate the sonological patterns of lymphocytic thyroiditis. Though there are many studies discussing the prevalence of thyroid disorder,

those discussing the imaging appearance of lymphocytic thyroiditis in Kerala are rare.

### Imaging technique and protocol

The study was designed as a descriptive study, with diagnostic test evaluation, conducted in the Department of Radiodiagnosis, Govt TD medical college, Alappuzha, during the period January 2014 – June 2015. 89 patients, in the age group of 18- 80 years with diffuse neck swelling, who came for sonographic examination of thyroid in the dept. of Radiodiagnosis, were included in the study. Those patients not giving consent and woman detected to have post partum thyroiditis, (within one year after child birth) were excluded from the study.

Sonographic examination was done using a Siemens Acuson sonographic machine with VF 13- 5 MHz linear transducer. Sonographic examinations was performed by the same researcher for all patients. Gray-scale sonography parameters included size of the thyroid gland, echogenicity pattern, presence of micronodules, fibrotic strands and calcification.

The informed consent from patient was obtained and ultrasonography of thyroid was done using a linear transducer in thyroid preset. The patient was examined in supine position with neck extended. A small pad was kept under the shoulder to provide better exposure of neck in patients with short habitus.

During the procedure, both lobes of thyroid was examined in at least 2 projections: axial (transverse) and sagittal (longitudinal) planes. To decrease the machine occupancy time and there by utilize the time and resources effectively, anteroposterior diameter of thyroid was measured in this study.

Sonographic picture of lymphocytic thyroiditis is defined as diffusely heterogeneous hypoechogenicity, micronodulation and fibrotic septations. In auto immune thyroiditis, lymphocytic infiltration and disruption of tissue architecture cause a reduction in thyroid echogenicity. Reduced thyroid echogenicity detected by thyroid ultrasonography is a strong predictor of auto immune thyroiditis

even when these disorders have not been suspected clinically

The echogenicity pattern of thyroid was divided into three patterns in the present study

Pattern	Compared to submandibular gland	Compared to neck muscles
Pattern 1	normal:	hyperechoic
Pattern 2	hypoechoic	Hyperechoic
Pattern 3	iso-/hypoechoic	hypoechoic

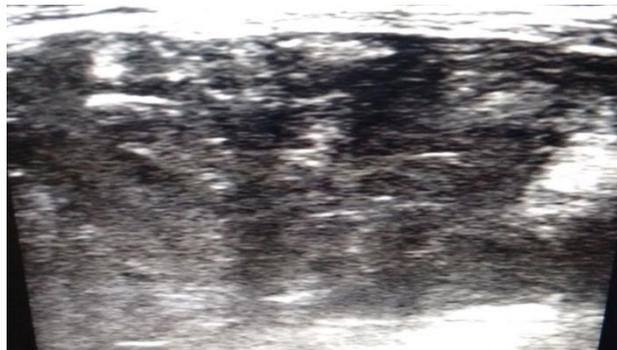
Micronodules were defined as discrete hypoechoic nodules of 1-6mm in diameter Echogenic fibrotic septations are noted in the lymphocytic thyroiditis, which are considered to be result of fibrosis within the parenchyma.

Fine needle aspiration cytology is done in supine position, immediately after the sonographic examination. A small pad may be placed under the shoulder to provide better exposure of neck in patients with short habitus. The thyroid gland is visualized with linear transducer in thyroid setting. The site for aspiration cytology is marked and the transducer is placed over the site. A 23 gauge needle is placed on the site of interest by adjusting the transducer so that the site is not changed. The needle is pushed forward and the aspirate is obtained using a 10 cc syringe. The patient is observed for half an hour for any complications.

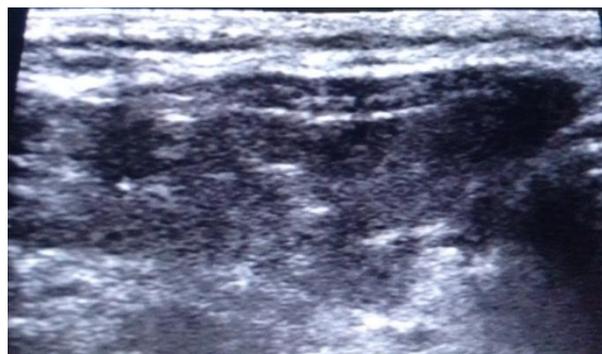
The data collected was entered and assessed in Microsoft excel sheet. Analysis of data was done in SPSS version 17.0 and DAG Stat software package. Frequency of variables, correlation between variables, sensitivity, specificity, positive predictive value , negative predictive value, accuracy, likelihood ratios were calculated after plotting 2X2 table. A ROC curve was plotted and a cut off for anteroposterior diameter and RI value was calculated.

### Results

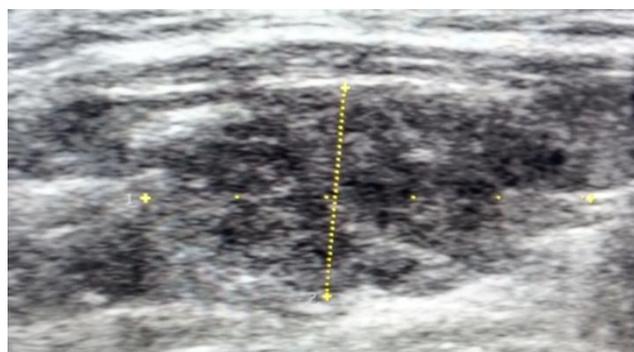
A total of 89 patients were studied, as the cytology results of 7 patients cam as inconclusive they were excluded from the study. Out of the 82 patients, 52 patient were diagnosed as lymphocytic thyroiditis in the study sample.



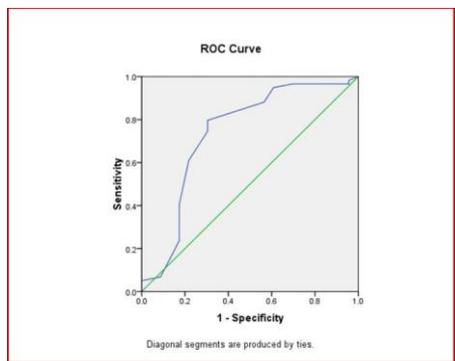
**Fig 1:** Hypoechoic thyroid parenchyma with fibrotic strands



**Fig 2:** Hypoechoic thyroid parenchyma with multiple Micro nodules

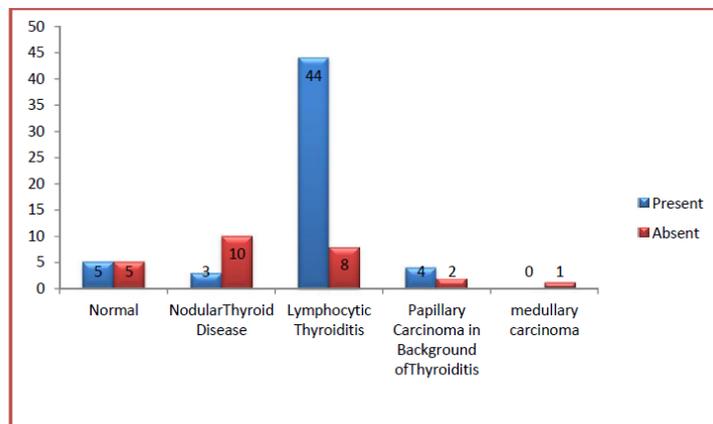


**Fig 3:-**Heterogeneous hypoechoic thyroid parenchyma with multiple micronodules and fibrotic strands



**Fig 4:-** ROC curve for anteroposterior diameter of thyroid, Area under the curve 0.737

It was observed that taking a cut off value of 1.25 cm for anteroposterior diameter of thyroid has a sensitivity of 80% and specificity of 70%, suggesting that lymphocytic thyroiditis is not essentially goitrogenic



**Fig 5:** Relation of abnormal echogenicity (pattern 2 or 3) to cytology results obtained in study sample.

**Table:1**

Sl.No	Variables	Sensitivity %	Specificity %	Ppv %	Npv %	Accuracy %
1	Enlargement of thyroid	27.12	78.2	76.19	29.5	41.7.
2	Pattern 2 or 3 echogenicity	81.3	65.2	85.6	57.6	76.8
3	Pattern 3 echogenicity	67.8	82.6	90.9	50	71.9
4	Presence of micronodules	66	78	88.6	47.4	69.5
5	Presence of fibrotic strands	81	65	85	57	76.8
6	Absence of calcification	86	43.4	79.6	55.6	74.3]
11	Grey scale combinations (pattern 2 or 3 echogenicity ,presence of micronodules and fibrotic septae-3 parameters)	54	86	91.4	42.5	63.4

**Discussion**

In this study involving 82 patients with diffuse thyroid swelling, 52 patients were diagnosed as having lymphocytic thyroiditis by cytology. Most of the patients, were females belong to the age group 30-50, consistent with the studies conducted by deshmkh et al<sup>1</sup> and hemalata et al<sup>2</sup>. The median age in this study is 39 age, younger when compared to the western population, where median age is 49 years<sup>3</sup>. The 80% of the study sample were females, consistent with studies by the Deshmukh et al<sup>1</sup> Usha et al<sup>4</sup> and Anderson et al<sup>5</sup>.

From the analysis it is observed that the positive predictive value of abnormal echogenicity (pattern 2 or 3) in detecting lymphocytic thyroiditis is 85.6, and that of pattern 3 echogenicity is 90.9- both values are similar to the results obtained (87% and 96%) by raber et al.

Micronodulation is considered as a sensitive sign for lymphocytic thyroiditis, with positive predictive value of 94% and 93.9% in a study conducted by Yeh et al<sup>6</sup> and Acar et al<sup>11</sup> respectively.

In the present study it is observed that positive predictive value of micronodules in diagnosing lymphocytic thyroiditis is 88.6.

Echogenic fibrotic septations are noted in the lymphocytic thyroiditis, which are considered to be the result of fibrosis within the parenchyma as per studies of Yeh et al<sup>6</sup> and Pedersen et al<sup>8</sup>.

In the present study it is observed that the sensitivity, specificity, PPV, NPV of fibrotic strands in diagnosing lymphocytic thyroiditis is 81%, 65%, 85%, and 57% respectively which is consistent with findings of Ceylan et al<sup>9</sup>.

Various patterns of calcifications were observed in the study sample was analyzed. It was then observed that absence of calcification is sensitive for diagnosing lymphocytic thyroiditis in the study sample but less specific. Similar finding was observed by Sena hwang et al<sup>10</sup> in their study to differentiate focal lymphocytic thyroiditis from papillary carcinoma

### Conclusion

- Lymphocytic thyroiditis was seen mostly in people with age group 30-50.
- The mean age of study sample with diagnosis as lymphocytic thyroiditis was 39 years.
- Females are commonly associated with lymphocytic thyroiditis.
- 15% lymphocytic thyroiditis was found to have no sonographic abnormality in the present study.
- A new cut off value for anteroposterior diameter of 1.2 cm is obtained from the receiver operator characteristic curve

which can diagnose lymphocytic thyroiditis with 70% sensitivity and 60% specificity.

- The combination of the greyscale parameters, and absence of calcification can diagnose lymphocytic thyroiditis with sensitivity, specificity, positive predictive value, negative predictive value and accuracy of 85%, 70%, 88%, 64% and 80% respectively

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