



## Original Research Article

## Cytomorphological variations in Hashimoto's thyroiditis: A study of 164 cases

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## Abstract

**Background:** Hashimoto's thyroiditis is the second most common cause of hypothyroidism following goiter and FNAC has been found to be one of the essential procedures done to diagnose it. Our aim is to analyse the cytomorphological diversity of this disease along with the biochemical profile correlation and also to identify the salient features in this disease which are indicative of malignancy.

**Materials and Methods:** 164 FNAC smears cytologically diagnosed as Hashimoto's thyroiditis (both air dried and alcohol fixed) were analysed to identify the cytomorphological features and correlated with biochemical values. Features indicative of malignancy have also been observed. Results have been formulated in suitable tables and charts.

**Results:** Majority of the cases were females between 31-40 years of age presenting predominantly with diffuse neck swelling and hypothyroidism. Predominant cytological features identified were lymphoid aggregates, Hurthle cells and anisocytosis. Also 48 cases have shown cytological features indicative of malignancy which includes nuclear grooving, intracytoplasmic lumina, transgressing blood vessels and pseudoinclusions. Most of the cases showed GRADE 2 thyroiditis with predominance of hypothyroidism as per the cytological grading laid down by Bhatia et al.

**Conclusion:** Hence we can say that Hashimoto's thyroiditis is a disease which affects middle aged women predominantly presenting with hypothyroidism. FNAC plays an important role in diagnosing it even in limited settings. It becomes very important to diagnosing the varied cytological features, to indicate whether it has tendency to turn malignant, so that suitable mode of management can be put forth thereby preventing unnecessary surgeries.

**Keywords:** Hypothyroidism, Malignancy, Hurthle cells, Cytomorphological, Hashimoto's thyroiditis.

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## 1. Introduction

Hashimoto's thyroiditis is an autoimmune disorder described for the first time by Dr Hakuru Hashimoto in 1912.<sup>1-3</sup> It is the next common thyroid lesion following goiter, seen among the middle aged women, also seen in adolescent age group and children.<sup>4,5</sup> It clinically presents as diffuse or at times nodular swelling, most patients are asymptomatic while some of them present with hypothyroidism.<sup>6</sup>

The initial stages of disease and in the milder forms, the results of thyroid function tests and TPO antibodies are not reliable indicators because of variations. Hence FNAC plays a pivotal role in its diagnosis as it is simple and economical. It is the preferred method of choice for all thyroid lesions at the initial diagnostic stage in developing countries where accessing diagnostic techniques like hormonal assays,

antibody testing and sophisticated radiological scanning are difficult.<sup>7</sup>

Hashimoto Thyroiditis has been attributed as risk factor of papillary carcinoma of thyroid, extra nodal marginal B cell lymphoma, other endocrine and non-endocrine autoimmune diseases like Type 1 Diabetes, Autoimmune Adrenalitis, SLE, Myasthenia Gravis and Sjogren's syndrome hence affecting the quality of life of people suffering from it.<sup>3</sup>

Hence it becomes extremely important to diagnose the disease at an early stage so that it can be treated through medical modalities and to prevent undue outcomes as well as redundant surgeries. There is increased evidence of unrecognised hypothyroidism being harmful, hence its early detection serves as an advantage in predicting thyroid failure.<sup>8</sup>

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The present study attempts to analyse the Cytomorphological variations in Hashimoto’s thyroiditis and correlates these findings with biochemical findings (T3, T4, TSH) wherever available.

It also attempts to analyse the Cytomorphological and nuclear features indicative of malignancy in Hashimoto’s thyroiditis with a notion to help to detect associated malignancies at the earliest.

2. Materials and Methods

This descriptive study was conducted on 164 FNAC samples cytologically diagnosed as Hashimoto’s thyroiditis received in the cytology section, Department of Pathology at Karnataka Institute of Medical Sciences, Hubballi from March 2020-March 2024. FNAC was done, using 22-23 guage needle and 10 ml disposable syringe. Smears were air dried for Giemsa and Leishman stain, alcohol fixed for haematoxylin and eosin stain. The cytomorphological observations from 164 cases diagnosed as Hashimoto’s thyroiditis by fine needle aspiration cytology were reviewed by 4 pathologists to find the variations and correlated with biochemical values (T3, T4, TSH) wherever available. All the 164 cases that have been taken in this study were correlated with histopathology and have been diagnosed as via histopathology as Hashimoto’s thyroiditis. All patients in the age group 10 to 75 years with thyroid profile values according to WHO satisfying the diagnostic criteria for Hashimoto’s Thyroiditis in males and females were included in the study. Exclusion criteria included all the neoplastic lesions, combined neoplastic and Hashimoto’s lesions and colloid goiter cases. 164 cytologically diagnosed Hashimoto’s thyroiditis cases have been taken to study the varied cytomorphological features to determine its malignant potential. Results were statistically analysed and presented in form of tables and charts.

3. Results

A total of 164 cases of Hashimoto’s thyroiditis have been studied and analyzed from March 2020 till March 2024.

Majority of the subjects were in the age group 31-40 years of age (32.31%) followed by 10-20 years of age (20.12%). Mostly affected were females (female to male ratio 11.6:1).(Table 1)

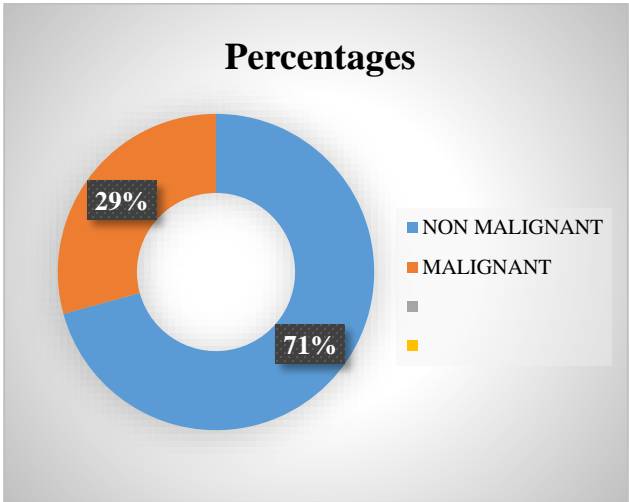


Figure 1: Showing percentage of Hashimoto’s thyroid cases showing malignant

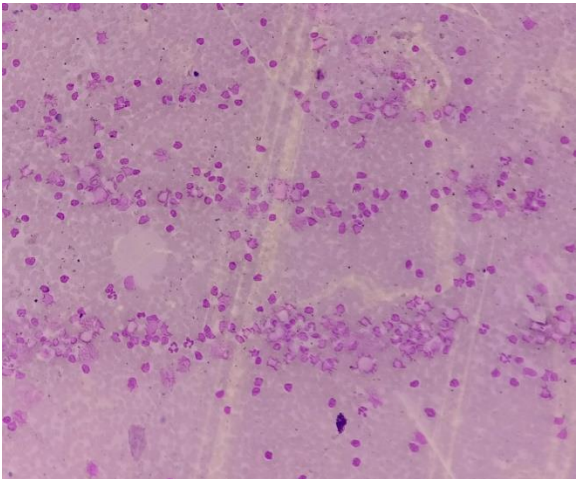


Figure 2: Fine Needle aspiration cytology smears showing grade I Hashimoto’s thyroiditis with lymphoglandular bodies and neutrophils

Table 1: Showing age distribution and gender of study subjects both in number and percentage

Age group (in years)	Males (number)	Percentage (%)	Females (number)	Percentage (%)	Total number N=164	Percentage (100%)
10-20 YRS	3	9.09	30	90.9	33	20.12
21-30 YRS	3	9.67	28	90.32	31	18.9
31-40 YRS	5	9.43	48	90.56	53	32.31
41-50 YRS	1	3.33	29	96.6	30	18.29
51-60 YRS	1	9.09	10	90.9	11	6.7
61-70 YRS	0	0	5	100	5	3.04
71-80 YRS	0	0	1	100	1	0.6

In **Table 2**, most of the subjects presented with diffuse swelling (92.68%). Around 12 cases had nodular presentation.

**Table 2:** Showing percentage of cases with diffuse or nodular presentation both in number and percentage

Shape of swelling	Number of cases	Percentage
Diffuse	152	92.68
Nodular	12	7.31

In **Table 3**, most of the subjects were found to be in hypothyroid state (79.26%) followed by euthyroid state.(20.73%)

**Table 3:** Showing the percentage of study subjects in different thyroid state at the time of presentation in both numbers and percentage

Thyroid state	Number	Percentage (%)
Hypothyroid	130	79.26
Euthyroid	34	20.73

In **Table 4**, the predominant cytomorphological features that were seen are lymphoid aggregates (154 cases 93.9%) followed by hurthle cells (123 cases 75%) and anisocytosis (86 cases 52.43%)

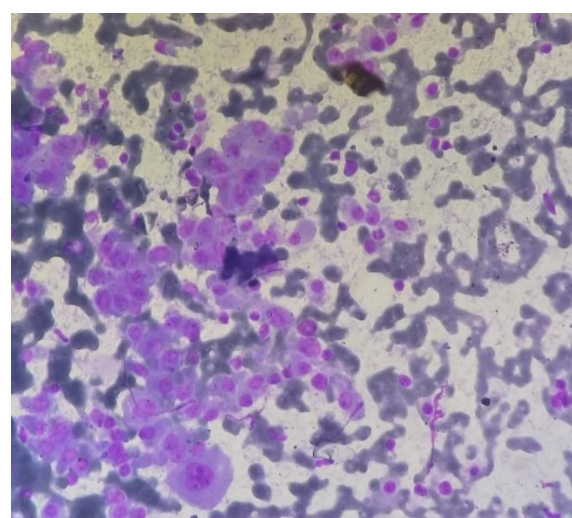
**Table 4:** Showing the various cytomorphological features in Hashimoto's Thyroiditis both in number and percentage

Cytology	Frequency	Percentage
Lymphoid aggregates	154	93.9
Hurthle cells	123	75
Anisocytosis	86	52.43
Granulomas formation	42	25.6
Nuclear grooves	2	1.21
Colloid	61	37.19
Plasma cells	55	33.53
Eosinophils	4	2.43
Multinucleated giant cells	28	17.07
Foamy macrophages	63	38.41
Follicular atypia	49	29.87
Lymphoglandular bodies	77	46.95
Crushed lymphocytes	59	35.97
Lymphohistiocytic clusters	29	17.68
Fireflares	1	0.6
Neutrophils	40	24.39
Stromal fragments	25	15.24
Intracytoplasmic lumen	24	14.63
Transgressing blood vessels	17	10.36
Pseudoinclusions	5	3.04

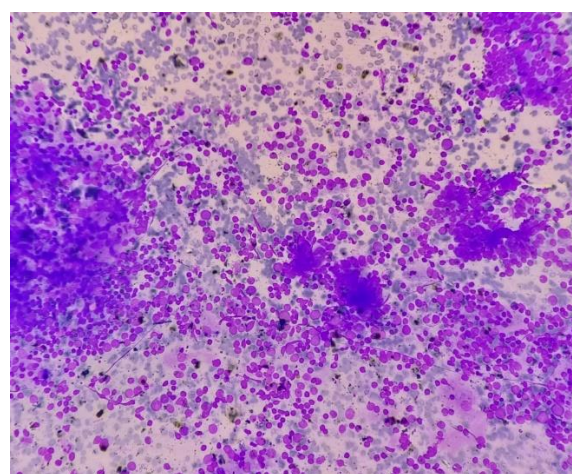
Out of the 164 cases studied 48 cases (29.24%) have shown features indicative of malignancy **Figure 1**.

**Table 5:** Showing cytomorphological features indicative of malignancy in study subjects in percentages

Cytomorphological features	Number of cases/subjects n=164	Percentages (%)
Nuclear grooving	2	1.21
Intracytoplasmic lumen	24	14.63
Transgressing blood vessels	17	10.36
Pseudoinclusions	5	3.04

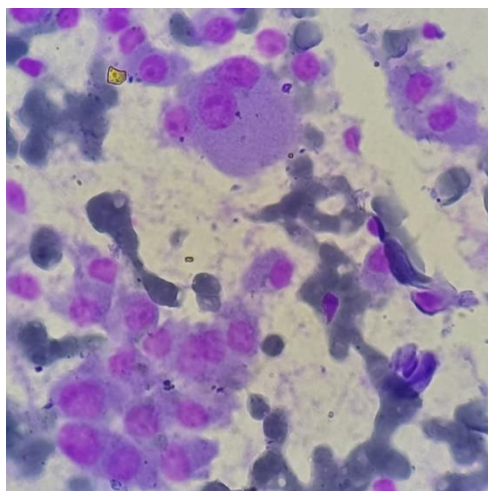


**Figure 3:** Fine needle aspiration cytology smears of hashimoto's thyroiditis showing hurthle cell aggregates. (Grade II Hashimoto's thyroiditis)

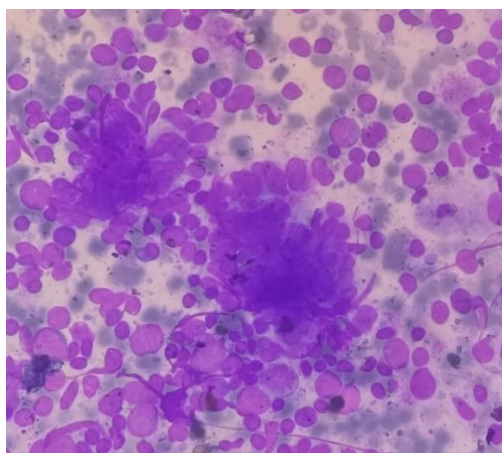


**Figure 4:** Fine needle aspiration cytology smears showing grade 3 Hashimoto's thyroiditis

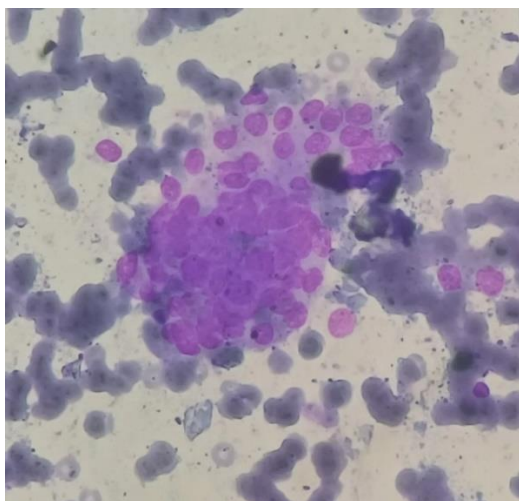




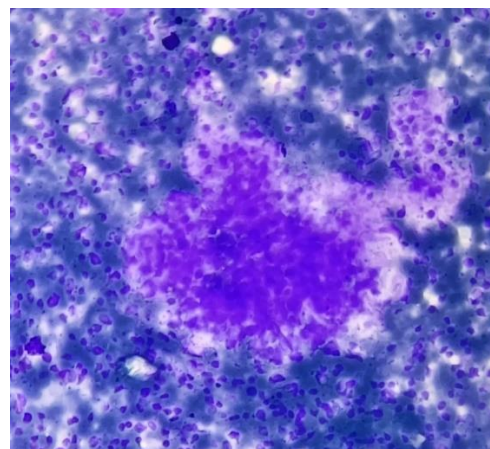
**Figure 5:** Fine needle aspiration cytology smears of Hashimoto's thyroiditis showing binucleated hürthle cell



**Figure 6:** Granulomas in fine needle aspiration cytology smears of Hashimoto's thyroiditis



**Figure 7:** Multinucleated giant cell in fine needle aspiration cytology smears of Hashimoto's thyroiditis



**Figure 8:** Fire flares in fine needle aspiration cytology smears of Hashimoto's thyroiditis

#### 4. Discussion

Hashimoto's thyroiditis is a chronic inflammatory disorder of autoimmune etiology of the thyroid gland where there is infiltration by T and B lymphocytes. These T and B lymphocytes are reactive to thyroid antigens. Autoantibodies are secreted by activated B cells and cytotoxic T lymphocytes are responsible for the destruction of thyroid parenchyma. In long-standing cases, the follicles are eventually substituted by fibrosis. The disease in its active phase presents clinically as thyrotoxicosis which is usually considered as a transient phase. Other phases include the evolution and destructive phases, presenting as subclinical and overt hypothyroidism.<sup>9,10</sup>

Fine needle aspiration cytology is a key and relevant conclusive method in diagnosing Hashimoto's thyroiditis in conjunction with clinical details, biochemical test results, immunological studies and ultrasound techniques.<sup>7,11-13</sup>

The present study has shown that Hashimoto's thyroiditis predominantly in females and in the age group of 31-40 years of age similar to study conducted by Pabitatevi et al,<sup>17</sup> with female to male ratio being 11.6:1 similar to studies conducted by Ashwin P Khageshan et al, Siriweera EH et al and Singh.<sup>14-16</sup>

This high female preponderance could be related to variation in racial characteristics.<sup>17</sup> Few studies have shown that this disease occurs mainly in females of reproductive age group in view of high estrogen levels.<sup>18</sup> Hashimoto's thyroiditis affects females in the fourth decade and above in the non-endemic areas.<sup>7</sup> In our study increase in younger population having the disease can be attributed to the fact that they live in iodine deficient non coastal areas which is in concordance with other studies.<sup>19,20</sup> Maximum number of the patients diagnosed with HT in our study were in 2<sup>nd</sup>-4<sup>th</sup> decade of life, which is similar to study conducted by Sood N et al.<sup>6</sup> However, in developed countries this disease is predominantly seen at 45-65 years of age, 10 to 20 years later, compared to the developing countries.<sup>18,21</sup>

Most of the patients in our study have presented in hypothyroid state (75.6%) followed by euthyroid state (24.39%). This is similar to the study conducted by Ekambaram M et al and Rathi M et al where majority of the patients showed hypothyroid (84% and 56.09% respectively).<sup>2,14,22</sup> In early stages patient can be euthyroid or show subclinical hypothyroidism or even show hyperthyroidism.<sup>18</sup> Overt hypothyroidism progresses gradually over several years.<sup>18</sup> Therefore all these stages do not rule out Hashimoto's thyroiditis.<sup>18</sup>

The transient hyperthyroid phase in Hashimoto's thyroiditis, also known as hashitoxicosis has incidence ranging from 6%-25%.<sup>18-20</sup> This will be followed by hypothyroidism.<sup>1</sup> In our study only 1 patient presented with hashitoxicosis.

There is a wide range of normal values of TSH and variations in presence of TPO antibodies, making it understandable that early stages can be clinically missed.<sup>8</sup> These issues along with the knowledge that subclinical and clinical hypothyroidism associates with cardiovascular, neuropsychiatric morbidities, makes finding of Hashimoto's thyroiditis on cytology aspirates of euthyroid patients clinically significant.<sup>8</sup> Most of the patients are premenopausal women in our study. Past and recent studies have shown that poor obstetric outcome risk increases with normal to high TSH levels.<sup>8</sup> Based on results of high prevalence of cytology proven Hashimoto's thyroiditis cases and especially high prevalence of euthyroid cases in the premenopausal women, it necessitates follow up of thyroid function tests on such cases in preconception during delivery stages.<sup>8</sup>

In our study HT presented with diffuse enlargement of the thyroid gland (92.68%) but few also presented with nodular enlargement (7.31%) showing concordance with other studies.<sup>6,7,18,23,28</sup>

In diffuse type there is entire gland enlargement with no nodularity. Nodular lesions have many nodularity or single nodule can be seen.<sup>23</sup> Few recent studies from South India have shown that nodular enlargement of the thyroid gland is also common in HT.<sup>1,23,24</sup> This assumes clinical significance because there is a risk of thyroid malignancy in patients with HT.<sup>1,25,26</sup> Hence it becomes critical that cases of HT presenting with nodular enlargement are not misinterpreted as nodular goiter.<sup>1</sup>

Cytomorphological features have been analyzed for all 164 subjects and interesting findings have been found. Predominant findings found in our study were lymphoid aggregates 93.9%, hurtle cells 75% and anisocytosis 52.4%. This is in concordance with other studies like in study conducted by Devendrappa et al where findings included lymphoid aggregates 92.86%, hurthle cells 73.21%, anisocytosis in 21.4% of cases.<sup>11</sup>

Studies conducted by Rathi et al showed lymphoid follicle formation in 54% of cases followed by Hurthle cells in 74% of cases.<sup>2,11</sup> Studies done by Sanyal et al also showed predominance of HT in women of hypothyroid state and cytologically characterized by lymphocytic infiltration, Ashkenazy (Hurthle cells).<sup>11,27</sup> Increased lymphocytic infiltration and hurthle cell change signify marked follicular destruction probably indicating a hypothyroid state.<sup>20</sup> Presence of background lymphocytic infiltration can lead to over-diagnosis hence needing cautious interpretation along with other Cytomorphological features to prevent its false positive diagnosis.<sup>10</sup>

Other features found in our study were granulomas 25.6%, colloid 37.19%, plasma cells 33.53%, eosinophil's 2.43%, multinucleated giant cells 17.07%, foamy macrophages 38.41%, follicular atypia 29.87%, lymphoglandular bodies 46.95%, crushed lymphocytes 35.97%, lymphohistiocytic clusters 17.68%, fire flakes 4.87%, stromal fragments 15.24% and neutrophils 24.39%. Other studies have also shown similar findings. **(Figure 5 and Figure 6)**

In our study 37.19% of smears showed presence of colloid. Scant to absent and scant to moderate colloid has also been reported in studies conducted by Kumar N et al and Thomas et al respectively. Chandanwale et al have also reported scant colloid in 8 cases and Ranabhat et al have also reported 92.3% of cases having absent or scant colloid. It is stated that absence or scanty colloid is a usual feature in Hashimoto's Thyroiditis, but paradoxical presence of colloid is not unusual due to a combination of iodine supplementation and autoimmunity.<sup>13,16</sup> Abundant colloid masks lymphocytic infiltration. Hashimoto's thyroiditis may remain undiagnosed if the cytopathologist is not cautious in searching for lymphocytes infiltrating epithelial groups, and eliminating sampling errors by multiple punctures.<sup>7</sup> Scant colloid have also been reported in cases of Hurthle cell neoplasms.

In our study 33.53% of smears showed plasma cells similar to other studies. Thomas et al have reported 75% cases of HT smears showing plasma cells. Plasma cells are useful in diagnosing early Hashimoto's Thyroiditis where lymphocytic infiltration of follicles is insignificant.<sup>16,28</sup>

Giant cells and infiltration of follicular cells by neutrophils have also been found in our study 17.07% and 23.49% respectively suggesting a possibility of subacute thyroiditis. However they were few in number and increased infiltration of follicular cells by lymphocytes, presence of lymphoid follicles excluded this suggestion.<sup>20</sup> Ranabhat et al have reported 92.3% of multinucleated giant cells where number of nuclei per giant cell ranged from 2-125, citing the possibility of large multinucleated giant cells in these patients. But as per cytological literature, multinucleated foreign body type of giant cells are infrequent findings here and state that if multinucleated giant cells are large in

numbers and have many nuclei, suspicion of granulomatous thyroiditis should be considered.<sup>18</sup> In Hashimoto's thyroiditis, multinucleated giant cells are small and contain fewer nuclei.<sup>12,28</sup> (**Figure 7**)

Fireflares have been noted in our study (0.6%) similar to findings of Rath et al and Chandanwale et al, but there were few studies showing higher percentages. It is known that fireflares are seen in both benign and malignant conditions. Graves' Disease can be excluded on basis of high L:E ratio and follicular degeneration.<sup>20</sup> (**Figure 8**)

However Ekambaram M et al and Rath et al have reported 84% eosinophils in their study of 42 cases and 48% eosinophils in their study of 50 cases respectively. They have found eosinophilic infiltration to have higher association with Hashimoto's thyroiditis.<sup>2,22</sup> It is important to diagnose HT because patients need lifelong thyroxin supplementation for hypothyroidism.<sup>22</sup> In our study only 2.43% of eosinophils were noted which is in concordance with Devendrappa et al.(3.57%).<sup>11</sup> (**Table 6**)

The most consistent finding in FNA smears of Hashimoto thyroiditis cases were increased lymphocytic background, lymphocytic infiltration of thyroid follicular cell clusters and Hurthle cells. Similar findings were found in our study.

HT shows two patterns in cytology smears which correspond to different phases of the disease.<sup>19</sup>

1. Classic HT- smears show increased background lymphocytes and follicular cell clusters by lymphocytes
2. Florid lymphocytic pattern – smears show dominant lymphoid cell population in stages of maturation. Epithelial cells may be inconspicuous.

In our study Classic HT features were predominantly present but no clear florid lymphocytic pattern of HT were seen.

Also in our study we have found certain features indicative towards malignancy. Those include nuclear grooving 2 cases (1.21%), intracytoplasmic lumina (ICL) 24 cases (14.63%), transgressing blood vessels (TBVs) 17 cases (10.36%) and pseudo inclusions 5 cases (3.04%).(**Table 5**) Similar findings have been found in other studies.

In our study 1.21% of smears showed longitudinal nuclear grooves similar to findings found by Devendrappa et al. Scopa et al had studied 80 cases of non-papillary thyroid carcinoma (PTC) lesions and have found 86% of these cases had longitudinal nuclear grooves.<sup>30,31</sup> In a study conducted by Perez- Montiel and Suster on 300 unselected consecutive cases of thyroid nodular hyperplasia, longitudinal nuclear grooves were detected in 8% of the cases.<sup>31,32</sup> This acknowledges the fact that longitudinal nuclear grooves may also be present in conditions other than PTC.<sup>31</sup>

Pseudoinclusions have been reported in 5 cases (3.04%) indicating malignant potential.

In our study intracytoplasmic lumina (ICL) (14.63%) and transgressing blood vessels (TBVs) (10.36%) have been seen in few of HT cases. Recent reports have emphasized the importance of ICL and TBV as useful criteria to enable distinguishing between neoplastic and non-neoplastic Hurthle cell lesions in thyroid aspirates.<sup>33-36</sup> its use may improve the sensitivity and specificity of the cytological diagnosis.

Intracytoplasmic lumina appear as empty vacuoles or as vacuoles with magenta material inside.<sup>37</sup> The cytoplasmic vacuoles demonstrate positive immunoreaction for thyroglobulin in both aspirate smears and tissue sections.<sup>37</sup> An intracytoplasmic lumen is a single intracytoplasmic vacuole with sharply demarcated, punched out edges completely surrounded by cytoplasm located in the perinuclear region indenting the nucleus.<sup>38</sup>

**Table 6:** Comparison of cytological features of HT with other studies.<sup>2,11,20,28</sup>

Cytological Features	Present Study	Rathi et al <sup>2</sup> 2013	Jayaram et al <sup>20</sup> 2007	Kini et al <sup>1</sup> 1981	Devendrappa et al. <sup>11</sup> 2017
Number of cases	n= 164	n= 50	n= 88	n=87	n=56
Lymphoid aggregates	93.9%	54%	67%	present	92.86%
Hurthle cells	75%	74%	56%	variable	73.21%
Follicular atypia	29.87%	36%	44%	often	Not recorded
Eosinophils	2.43%	48%	17%	Not recorded	3.57%
Neutrophils	23.49%	26%	17%	Not recorded	Not recorded
Plasma cells	33.53%	18%	40%	present	14.29%
Fire flares	4.87%	4%	23%	Not recorded	Not recorded
Granuloma	25.6%	6%	16%	Not recorded	17.86%
Giant cell	17.07%	6%	39%	rare	16.07%
Anisocytosis	52.4%	present	Not recorded	Not recorded	21.4%
Colloid	37.19%	Not recorded	present	Not recorded	26.79%

Transgressing blood vessels were defined as capillary fragments / bland spindle cells arranged in linear pattern coursing through loose cohesive groups / sheets of Hurthle cells and are easily detected at intermediate magnification (10-20 objective).<sup>33,35,38</sup>

Quantitatively the smears were evaluated and graded based on criteria given by Bhatia et al. This Cytological grading criteria was based on amount of lymphocytic infiltration of the gland and in the background, presence of germinal centers, Hurthle cells, giant cells and anisonucleosis.<sup>3,9</sup> However none of the cited articles have stated that this grading system is a standard criteria, but mentioned it to be just an aiding tool in diagnosing Hashimoto's thyroiditis.

Bhatia et al grading system<sup>9</sup>

Grade 1 {Mild}: Few lymphoid cells infiltrating the follicles/ increased number of lymphocytes in the background. (Figure 2)

Grade 2 {Moderate}: Moderate lymphocytic infiltration or mild lymphocytic infiltration with Hurthle cell change/ giant cells/ anisonucleosis. (Figure 3)

Grade 3 {Severe}: Florid lymphocytic inflammation with germinal center formation, very few follicular cells left. (Figure 4)

In our study maximum of the subjects were GRADE 2 (48.79%) and predominantly in hypothyroid state (75%). This is similar to the findings found in other studies.

Also in our study we have found some form of relationship between the cytological grades and biochemical status. Out of the 164 cases studied, most of the subjects presented with Grade 2 thyroiditis. (48.78%). We also found that both grade 1 and grade 2 cytological grading being prominent in hypothyroid cases. (82.66% and 75%) respectively. These were similar to the findings recorded by Ekambaram et al, Rathi et al and Sharma et al where majority of the subjects with euthyroid and hypothyroid status had grade 1 and grade 2 thyroiditis. But unlike their study, in our study both Grade 1 and 2 cases were predominantly hypothyroid.

The predominant euthyroid status in Grade 1 thyroiditis could be due to lesser number of follicular cell destruction and lymphocytic infiltration and the predominant hypothyroid status in Grade 2 thyroiditis is due to progressive loss of follicular cells and their replacement by the lymphoplasmacytic infiltrate.<sup>6</sup> Diffuse thyroiditis can occur in grade 1 thyroiditis cases even before overt thyroid failure and is the strong predictor of the autoimmune process even when the disorder has not been suspected clinically.<sup>14</sup> In Grade 2 thyroiditis most cases were hypothyroid which was similar to the study conducted by P. Ashwin et al and Sharma et al. Higher grades of thyroiditis is associated with abnormal hormonal or biochemical assay.<sup>6</sup> In our study Grade 3

thyroiditis subjects were mostly hypothyroid, similar to study conducted by P. Ashwin et al. (Table 7)

**Table 7:** Comparison of cytological grade findings

Study	Cytological Grade Findings
Present study	Hypothyroid status predominantly in Grade 1 and Grade 2 thyroiditis. Grade 3 thyroiditis were predominantly hypothyroid
Ekambaram et al. <sup>22</sup>	Predominantly euthyroid status noted in Grade 1 thyroiditis. Hypothyroid status noted in Grade 2 and Grade 3 thyroiditis.
Rathi et al. <sup>2</sup>	Predominantly euthyroid status noted in Grade 1 thyroiditis. Hypothyroid status noted in Grade 2 and Grade 3 thyroiditis.
Sharma et al. <sup>6</sup>	Predominantly euthyroid status noted in Grade 1 thyroiditis. Hypothyroid status noted in Grade 2 and Grade 3 thyroiditis.
P. Ashwin et al. <sup>14</sup>	Predominantly euthyroid status noted in Grade 1 thyroiditis. Hypothyroid status noted in Grade 2 and Grade 3 thyroiditis.
Ashraf et al. <sup>40</sup>	Hypothyroid status predominantly in Grade 1 and Grade 2 thyroiditis. Grade 3 thyroiditis were predominantly hypothyroid

Also in our study we have found that most of the cases with diffuse enlargement (49.34%) showed grade 2 Hashimoto's thyroiditis and were predominantly hypothyroid. Out of the 12 nodular cases 50% of the cases showed grade 2 Hashimoto's thyroiditis and were hypothyroid. This is similar to the findings of Kancharla et al who also stated that there was association between the biochemical profile and grade of HT. But in study conducted by Ashraf et al have concluded that though cytological grading was useful for diagnosing Hashimoto's thyroiditis it may not be a reliable indicator of its biochemical severity. This is further supported by the observations that many patients with HT have elevated ATPO (antithyroperoxidase antibody) and ATG (antithyroglobulin) levels, irrespective of the cytological grade, with normal TSH values.<sup>39,40</sup> This indicates that the autoimmune process, as evidenced by the presence of antithyroid antibodies, may precede the clinical and biochemical manifestations of thyroid dysfunction.<sup>40</sup> However Ashraf et al also stated that the cytological grading system laid down by Bhatia et al,<sup>9</sup> is a clear, easy to use diagnostic tool for the conformation of chronic lymphocytic thyroiditis i.e. Hashimoto's thyroiditis, which should be diagnosed with a multidisciplinary approach, as sole usage of clinical features and hormonal profile may result in a missed diagnosis.<sup>40</sup>

## 5. Limitations

Antithyroid antibody study could not be done in this study for correlation due to cost constraints and were not available in many cases. USG findings were not available in all cases.

## 6. Conclusion

The present study provides a detailed understanding of the various cytomorphological features of Hashimoto's thyroiditis in our institution. It commonly manifests in hypothyroid patients more so in middle aged women commonly presenting with diffuse neck enlargement which needs to be looked upon carefully. It has overlap of many Cytomorphological features and along with identifying the malignant features (especially Transgressing blood vessels and intracytoplasmic lumina) in Hurthle cell lesions is useful in distinguishing between a neoplastic and a non-neoplastic process. Stressing on the Cytomorphological features is essential for improving its detection via FNAC and preventing unnecessary surgeries. The new message we got from this study is that the detection of varied Cytomorphological features including the malignant features, helps us to identify the malignant potential of Hashimoto's thyroiditis. On identification of these malignant features surgical removal of thyroid gland becomes essential whereas if non-malignant features are present, conservative management can be given to these cases thereby preventing unnecessary surgeries.

## 7. Source of Funding

None.

## 8. Conflict of Interest

None.

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