A retrospective study on the epidemiology and management of thyroid disease

**Introduction:**
India has 42 million people suffering from thyroid disorders and new born children are prone to iodine deficiency. The recommended salt iodine fortification level of 15 parts per million provides 150μg of iodine per day. Iodine intake has been important determinant of the pattern of thyroid diseases; iodine induced hyperthyroidism (IHH) (thyrotoxicosis), autoimmune thyroiditis (AIT), and thyroid carcinoma. There is significant increase in the incidence for papillary carcinomas. The annual incidence is increase by 6.7% for women and 7.9% for men. Ultrasonogram neck guided fine needle assisted biopsy (FNAB) and measurement of serum thyroglobulin have resulted in the earlier diagnosis of the clinical manifestations of DTC. The less advanced tumour stages are treated with significantly better prognosis and advanced stages are treated aggressively [2]. The rate of thyroidectomy in men was lower than in women, while thyroid cancer in men is increasing more rapidly than in women [3]. There is increased incidence of thyroid cancer particularly papillary thyroid carcinoma [4]. The most common thyroid carcinoma is papillary thyroid carcinoma. Papillary carcinoma thyroid occurs in all age groups and young females were more commonly affected than males [5]. Patient who develop goiter due to iodine deficiency, high incidence of thyroid cancer. Iodine deficiency is associated with follicular thyroid cancers, whereas iodine excess is associated with papillary thyroid cancers [6]. Well differentiated thyroid carcinoma has an excellent prognosis that depends on surgery postoperative radio iodine ablation therapy [8]. Fine needle aspiration cytology (FNAC) is the first-line diagnostic test for evaluating thyroid nodules. It can effectively distinguish between neoplastic and non-neoplastic lesions of the thyroid except follicular thyroid carcinoma. FNAC can therefore decide the choice of management for neoplastic thyroid nodules [10]. FNAC avoids surgery in patients with benign nodules and is highly sensitive for diagnosing patients with malignant thyroid tumours [11]. FNAC is indicated for nodules ≤10 mm diameter only when suspicious ultrasound signs are present and nodules ≤5 mm should be monitored rather than biopsied [14]. Patient with a symmetrically enlarged thyroid, recent onset of orbitopathy, and moderate to severe hyperthyroidism, the diagnosis of grave’s disease is diagnosed and further evaluation for hyperthyroidism is unnecessary [15]. In iodine-replete areas autoimmune disease predominates ranging from primary atrophic hypothyroidism, Hashimoto’s thyroiditis to thyrotoxicosis caused by Graves’ disease. The prevalence of spontaneous hypothyroidism is between 1 and 2%, and it is more common in older women and 10 times more common in women than in men in iodine-replete region [17]. About 12% of adults have a palpable goiter. Autoimmune thyroiditis includes genetic predisposition, environmental factors, and endogenous factors. Autoimmune thyroid disease is more common than iodine deficiency as a cause of goiter in areas of iodine sufficient [18]. Hypothyroidism is more common in older women and 10 times more common in women than men. The prevalence of hyperthyroidism is more common in women than men [19]. In Western countries, the most common cause of primary hypothyroidism is autoimmune thyroiditis. However, in many parts of the world, iodine deficiency is most common cause of hypothyroidism [20]. Hypothyroidism is characterized by myxedema, end-organ effects and multisystem failure to an asymptomatic or subclinical condition with normal levels of thyroid and triiodothyronine and mildly elevated levels of serum thyrotropin [21]. In India, thyroid disorders are in a transition zone from iodine deficient region to iodine sufficient region but the prevalence of goiter has not declined [22]. The prevalence of primary hypothyroidism and hyperthyroidism has increased. This is due to an increasing incidence of disease and earlier diagnosis of disease [24]. Surgery followed by radioiodine therapy leads to a very low recurrence rate and decreased cancer death in patients than who do not respond to radioiodine treatment and who have a worse prognosis deserve increased efforts in follow-up and tentative alternative therapeutic approaches [25]. Age more than 45 years, PT size more than 4 cm, higher PT, ETE, positive margins, and distant metastasis at presentation (M1) are worst prognostic indicators. [26]. Hypothyroidism is a predisposing factor for coronary artery disease, infertility, metabolic syndrome, hyperlipoproteinemias. Similarly hyperthyroidism causes atrial fibrillation, ophthalmopathies and other metabolic disturbances [27]. Multifocal involvement of the PTC is associated with poorer prognosis and increased risk of lymph node metastasis and distant metastasis [28]. Anaplastic thyroid cancer (ATC) is an uncommon, malignancy in older adults with no effective systemic therapy and poor prognosis. The mean survival time is frequently less than 6 months from diagnosis [29].

**Materials and method:**
This is a retrospective study in the department of endocrine surgery in tertiary teaching centre in Chennai Madras Medical College from 1129 patients (981-females and 214-males) admitted in our ward 591(520- females and 71-males) patients who underwent thyroidectomy were subject to study. Preoperatively patients underwent routine investigations, thyroid function test, ultrasonogram neck, fine needle aspiration.
cystology, direct video laryngoscopy, if necessary computed
tomography neck and chest in case of malignancy and retrosternal
extension of thyroid gland for diagnosis. Patients were assessed and
posted for surgery. Specimen was routinely sent to pathology
department for histopathological examination (HPE) and for
immunohistochemistry if necessary. Patients were treated
according to their HPE reports. Benign cases were treated with
replacement dose of thyroxine and were followed periodically.
Papillary thyroid carcinoma were treated with radioactive iodine
ablation therapy by nuclear medicine department and then started
with suppressive dose of thyroxine and were followed up regularly.
Patient with medullary carcinoma thyroid were treated with
suppressive dose of thyroxine and were followed up. Patient with
anaplastic carcinoma were sent for external beam radiotherapy and
treated with suppressive dose of thyroxine and followed regularly.

Inclusion criteria:
Patient who underwent thyroidectomy for benign or malignant
thyroid disease was included in the study.

Exclusion criteria:
Patients with recurrent thyroid disease (benign or malignant) were
excluded from the study.

Descriptive statistics was done for all data and were reported in
terms of mean values and percentages. Suitable statistical tests
of comparison were done. Continuous variables were analysed with
the unpaired t test. Categorical variables were analysed with the Chi-
Square Test and Fisher Exact Test. Statistical significance was taken
as P < 0.05. The data was analysed using SPSS version 16 and
Microsoft Excel 2007.

Results:
591 suitable study subjects who underwent thyroidectomy were
selected to participate in the study. The sample group consisted of
71 male patients (12.01%) and 520 female patients (87.99%). The
demographic and clinical characteristics of the participants were
tested for significant differences.

Table-1: Age and gender

<table>
<thead>
<tr>
<th>Age Groups Distribution</th>
<th>Male</th>
<th>Female</th>
<th>Male %</th>
<th>Female %</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 20 years</td>
<td>9</td>
<td>32</td>
<td>12.88</td>
<td>6.15</td>
</tr>
<tr>
<td>21-40 years</td>
<td>23</td>
<td>252</td>
<td>32.39</td>
<td>48.46</td>
</tr>
<tr>
<td>41-60 years</td>
<td>91</td>
<td>231</td>
<td>45.66</td>
<td>40.58</td>
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<tr>
<td>&gt; 60 years</td>
<td>8</td>
<td>26</td>
<td>11.37</td>
<td>4.81</td>
</tr>
<tr>
<td>Total</td>
<td>71</td>
<td>520</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

In our study while analysing the age distribution in thyroidectomy
patients, majority of the male subjects belonged to the 41-60 years
age class interval (n=31, 43.66%) with a mean age of 41.27 years.
In the female group majority belonged to the 21-40 years age class
interval (n=252, 48.46%) with a mean age of 39.46 years (Table-1).
Females in reproductive age group are commonly affected. Females
were affected by thyroid disease more predominantly than males in
ratio of F: M - 7:1. In extreme age groups < 20 years and > 60 years the
incidence of thyroid disease is low in both females and males. The
standard deviation (SD) for males is 14.74 and for females is12.25.
The p value by unpaired test is 0.2551 is considered to be non-
significant since p value is > 0.05 as per unpaired t test.

NCG- Nodular colloid goiter, NCG-TC- Nodular colloid goiter with
toxic changes, HT-Hashimoto's thyroiditis, LYT-Lymphocytic
thyroiditis, AH-Adenomatous hyperplasia, HPE- Histopathological
examination

Most of the benign cases were found to be nodular colloid goiter
317 patients [females 292 (62.13%) and males 25 (44.64%)]. 64
patients [females 49 (10.43%) and males 15 (26.79%)] had nodular
colloid goiter with toxic changes. 59 [females-55 (11.7%) and males
4 (7.14%)] patients had hashimoto’s thyroiditis. 64 patients [females

Discussion:
In our study the increase in the incidence of thyroiditis especially
hashimoto’s thyroiditis is due to earlier diagnosis by ultrasonogram
imaging and increased accuracy of fine needle aspiration cystology/ biopsy which decides the adequate treatment. The iodine
supplementation has changed the geographical area of India from
iodine deficiency to iodine sufficient which leads to increased
incidence of thyroiditis. The increased incidence of nodular colloid
goiter is due to prolonged duration of thyroid swelling with irregular
removal which causes of waxing and waning of thyroid
stimulating hormone and negligence of the patient to seek
medical/surgical advice in earlier. The increased incidence of
papillary thyroid carcinoma is due to use of ultrasonogram with
Doppler studies and specific features of malignancy (hypoechocic
nodule, increased intrathyroidal vascularity, punctate
microlcalfication, absence of halo and extra thyroidal extension) and
use of ultrasonogram guided fine needle aspiration cystology/biopsy has made diagnosis easy and accurate. Papillary thyroid
carcinoma has good prognosis following specific surgery,
postoperative radio iodine ablation and suppressive dose of tablet
thyroxine and regular followup with clinical examination,
ultrasonogram, thyroid function test and serum thyroglobulin. The
incidence of follicular thyroid carcinoma has been reduced because of
elimination of iodine deficiency by iodine supplement and public
awareness. The increased incidence of micro papillary thyroid
carcinoma is due to increased use of ultrasonogram with Doppler
study to identify nodules less than 10mm in size. In our study medullary thyroid carcinoma patients are not associated with
multiple endocrine neoplasia syndrome or with family history
medullary thyroid carcinoma. All patients with medullary thyroid
carcinoma are sporadic.
Conclusion:
In our study there is increased incidence of hashimoto’s thyroiditis and papillary thyroid carcinoma which is due to iodine sufficiency or due to excess iodine intake. So the people at risk (excess iodine intake or low iodine intake) should be tested for mean urinary iodine intake or low iodine intake (iodine status for long term in years) and managed appropriately. In iodine excess regions iodine supplementations can be avoided and adequate iodine intake is recommended (100 to 200μg/day). Thus the incidence of papillary thyroid carcinoma and the incidence of thyroiditis can be decreased. In iodine deficient regions iodine supplementation foods rich in iodine like fish, sea food and seaweed are recommended. The cause of iodine deficiency in endemic goiter regions due to intake of goitrogens like cabbage, turnips, cassava, maize, millet, bamboo shoots and sweet potatoes should be avoided. Also protein energy malnutrition which co-exists frequently with endemic goiter should be corrected. Patients who develop hypothyroidism initially develop goiter (hyperplasia) and later to nodules. If patients identified in hyperplasia stage they can be treated with tablet thioracil so the goiter is reversible and surgery and surgery related complications can be avoided. The incidence of patients presenting with nodules can be reduced. So the patients presenting with goiter should be thoroughly evaluated clinically and investigated appropriately and managed specifically thereby reducing morbidity and mortality.

References:

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2. Jindrich Lukas, Jiri Drabek, David Lukas, Ladislav Dusek, Jiri Gater. Department of Otolaryngology, Head and Neck Surgery, Na Homolce Hospital, Prague and Faculty of Medicine, Charles University in Pilsen, Czech Republic
18. Rebecca Abraham, V Srivinasa Murugan, P Pukahvanathan and S K Sen Department of Biochemistry, Pondicherry Institute of Medical Sciences, Puducherry 605014, India Indian Journal of Clinical Biochemistry, 2009 /24(1)52-59
19. Ali J Chakera, Simon H Pearce, and Bijay Vaidya Published online 2011 Dec 22. doi: 10.2147/DDDT.S12894