ORIGINAL ARTICLE

An Audit of Thyroid Function in Patients with Goiter- a tertiary care hospital experience

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ABSTRACT

Aim: To carry out an audit of thyroid function in patients presenting with goiter.
Methodology: This prospective study was conducted at the Departments of ENT and Head & Neck Surgery, Hayatabad Medical Complex, Peshawar from January 1, 2013 to December 31, 2013. A total of 147 patients were studied. Thyroid function tests including serum Thyroxine (T4), Tri-iodothyronine (T3) and Thyroid stimulating hormone (TSH) levels estimation was carried out. Thyroid function was categorized into: Euthyroid, subclinical hypothyroidism, overt hypothyroidism, subclinical hyperthyroidism and overt hyperthyroidism. The thyroid profile was analyzed to determine frequencies for various conditions.
Results: The study included 147 patients with 30 males and 117 females. Multinodular goiter was the commonest entity (62%) as determined during physical examination. Majority of patients (88%) were euthyroid. Subclinical hyperthyroidism was seen in 4.8% of patients followed by overt hyperthyroidism in 3.4%. Out of the 30 males, 28 were euthyroid and 2 had subclinical hyperthyroidism in contrast to 101 and 5 for the respective categories in females. Statistical analysis for significance revealed that the differences in thyroid profile with respect to males and females were non- significant (P>0.05).
Conclusions: The majority of patients presenting with goiter are euthyroid albeit a small proportion which have a deranged profile. Estimation of serum T3, T4 and TSH provide a clue to the thyroid function. Patients with goiters should be routinely screened to institute proper treatment and avoid operative complications in those with abnormal profile and who may require surgery.
Keywords: Hyperthyroidism, hypothyroidism, goiter, thyroxine

INTRODUCTION

Goiter is a common presentation in clinical practice. Its true incidence is unknown but it is endemic in certain parts of our country especially Swat, Dir & Chitral districts of Khyber Pakhtunkhwa and Sukkur & Ghotki areas in Sindh[1,2]. According to the World Health Organization (WHO) report, 5% of the world's population suffers from goiter and 75% of these people live in iodine deficient areas[3]. The causes leading to the formation and the occurrence of goiter itself are likely to derange the function of the gland. In the United States, approximately 3% of men and 5% of women have subclinical thyroid disease and the proportion of overt thyroid disease in the same population is estimated to be 0.5%[4,5]**.**

Thyroid dysfunction has far reaching and lifelong effects on human health. Hyperthyroidism has several causes. Graves' disease is an immune mediated thyroid disease. It is associated with the formation of long-acting thyroid stimulating antibodies (LATS). Thyroid nodules, both single and multiple, excessive doses of oral thyroxine during therapy may all lead to hyperthyroidism. The causes of hypothyroidism include Hashimoto's thyroiditis, total or near total thyroidectomy, external beam radiation to the neck and treatment of hyperthyroidism with anti thyroid drugs, surgery or radio-active iodine.

The clinical manifestations of thyroid dysfunction vary much and depend upon the type and severity of thyroid disease. Persistent and untreated subclinical hypothyroidism may increase the risk for congestive cardiac failure and coronary artery disease[6]. Subclinical hyperthyroidism can lead to ischemic heart disease, cardiac dysrythmias and osteoporosis[7]. The sequelae of overt thyroid dysfunction are many and involve mainly the cardiovascular, central nervous system, ophthalmological, musculoskeletal, skin and GI tract. Screening for thyroid function can identify patients with undiagnosed subclinical and overt thyroid dysfunction. Early and timely institution of appropriate therapy, therefore, could prove to be of great benefits for these patients. The current study aims to analyze thyroid profiles of patients with goiter and determine the frequency of various abnormalities of thyroid function and thus help their proper management.

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METHODOLOGY

This study was conducted at the Departments of ENT and Head & Neck Surgery, Hayatabad Medical Complex, Peshawar from January 1, 2013 to December 31, 2013. The study included 147 cases of goiter presenting at the outpatient department and ENT ward. Sample size was calculated using WHO software for sample size determination with assumed 10% proportion of goiters, 95% confidence level and 5% margin of error. It was a prospective and descriptive study using the non-probability convenience sampling technique.

Inclusion criteria

1. Male & female patients of all ages
2. Patients with goiter and in whom biochemical tests of thyroid function were carried out.
3. Patients with recurrent thyroid enlargement after previous surgery.

Exclusion criteria

1. Patients with acute thyroiditis.
2. Enlargement of thyroid due to local invasion by carcinoma larynx.
3. Patients with thyroglossal cysts
4. Patients on thyroxine and or antithyroid drug therapy at presentation.

Patients fulfilling the laid down criteria were included in the study. Ethical approval for the study was obtained from the institutional ethical committee. Informed consent was obtained after explaining the procedure to the patients. A detailed history was obtained regarding thyroid enlargement, onset & progression of symptoms. Enquiries were made to look for symptoms of thyrotoxicosis such as sleeplessness, palpitations, anxiety and weight loss. Hypothyroidism and other associated symptoms such as puffiness, lassitude, somnolence, voice changes, difficulty in swallowing and difficulty in breathing were also enquired into.

Physical examination was carried out in the OPD or after admission in the ward. A general physical examination was followed by detailed ENT and systemic examination. Neck examination was carried out to look for enlargement of thyroid gland. The goiter was categorized, on the basis of physical examination into: Diffuse enlargement; when no nodule was palpable in the gland, Solitary thyroid nodule (STN); when a single nodule was palpated and Multinodular goiter (MNG); when more than one nodule were palpable. Signs of hyperthyroidism and hypothyroidism were looked for during the physical examination. Indirect laryngoscopy was carried out to assess the mobility of the vocal cords and neck was examined to see for enlarged neck nodes. Ultrasonography was advised in all patients. Other investigations such as baseline hematological, ECG, Echocardiography, X-ray Neck, X-ray thoracic inlet and X-ray chest, thyroid scanning and FNAC were carried out in selected cases to assess the disease and patients' general condition. Thyroid function tests were advised in all patients including serum estimation of Thyroxine (T4), Tri-iodothyronine (T3), Thyroid stimulating hormone (TSH) levels. Using the following reference ranges, thyroid function tests were categorized into: Euthyroid; 1. TSH level 0.5 - 4.5 mIU/L with normal T4 and T3 levels 2. Subclinical hypothyroidism; TSH level 4.5 – 10.0 mIU/L with normal T4 level or TSH level >/= 10 mIU/L with normal T4 level, 3. Overt hypothyroidism; TSH level > 4.5 mIU/L with low T4 level, 4. Subclinical hyperthyroidism; TSH level < 0.1 mIU/L with normal T4 and T3 levels or TSH level 0.1–0.4 mIU/L with normal T4 and T3 levels and 5. Overt hyperthyroidism; TSH level <0.1 mIU/L or undetectable with elevated T4 or T3 levels.

The data was recorded on a proforma and the descriptive statistics were analyzed to determine frequencies for variables like gender, age, type of goiter and status of thyroid function using SPSS 16

RESULTS

The study included 147 patients with 30 males and 117 females. The M: F ratio was 1:4. The age range was 18 to 70 years. The mean age of the patients was 36.76 years with standard deviation of +/-11.3. The commonest age group included in the study was 26-35 years (34.7%) followed by 36 - 45 years (26%) as shown in Tables 1 and 2. Multinodular goiter (MNG) was the commonest entity (62%) and diffuse hypertrophy was the least common finding (8.8%) as determined during physical examination (Table 3). The thyroid function tests/ profile of the patient are shown in Table 4. The vast majority of patients (88%) were euthyroid. Subclinical hyperthyroidism was seen in 4.8% of patients followed by overt hyperthyroidism in 3.4%. Overt and subclinical hyperthyroidism was most commonly seen in the 26-35 years age group as shown in Table 5. The thyroid profile and gender cross-tabulation shows that out of the 30 males, 28 were euthyroid and 2 had subclinical hyperthyroidism in contrast to 101 and 5 for the respective categories in females (Table 6). Statistical analysis for significance revealed that the differences in thyroid profile with respect to males and females were non-significant (P>0.05) as shown in Table 7.

Table 1: Gender of patients

Valid	Frequency	%	Valid%	Cumulative%
Male	30	20.4	20.4	20.4
Female	117	79.6	79.6	100.0

Table 2: Age group of patients

Valid	Frequency	%	Valid%	Cumulative%
15-25	30	20.4	20.4	20.4
26-35	51	34.7	34.7	55.1
36-45	38	25.9	25.9	81.0
46-55	19	12.9	12.9	93.9
56-65	6	4.1	4.1	98.0
<66	3	2.0	2.0	100.0

Table 3: Physical examination findings

Valid	Frequency	%	Valid%	Cumulative%
Diffuse hypertrophy	13	8.8	8.8	8.8
STN	43	29.3	29.3	38.1
MNG	91	61.9	61.9	100.0

STN= Solitary thyroid nodules MNG= Multinodular goiter

Table 4: Thyroid profile of patients

Valid	Frequency	%	Valid%	Cumulative%
Euthyroid	129	87.8	87.8	87.8
subclinical hypothyroidism	4	2.7	2.7	90.5
overt hypothyroidism	2	1.4	1.4	91.8
subclinical hyperthyroidism	7	4.8	4.8	96.6
overt hyperthyroidism	5	3.4	3.4	100.0

Table 5: Ages of the patients * Thyroid Profile of Patients Crosstabulation

Ages of the patients	Thyroid profile of patients					Total
	Euthyroid	subclinical hypothyroidism	overt hypothyroidism	subclinical hyperthyroidism	overt hyperthyroidism	
15-25	28	1	0	1	0	30
26-35	44	0	0	2	5	51
36-45	35	1	0	2	0	38
46-55	16	1	1	1	0	19
56-65	5	0	0	1	0	6
66 and above	1	1	1	0	0	3

Table 6: Thyroid Profile of Patients * Gender of patients Crosstabulation

Thyroid profile of pts	Male	Female	Total
Euthyroid	28	101	129
subclinical hypothyroidism	0	4	4
overt hypothyroidism	0	2	2
subclinical hyperthyroidism	2	5	7
overt hyperthyroidism	0	5	5

Table 7: Chi square tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.241[a]	4	.518
Likelihood Ratio	5.417	4	.247
Linear-by-Linear Association	.706	1	.401
N of Valid Cases	147		

a. 7 cells (70.0%) have expected count less than 5. The minimum expected count is .41.

DISCUSSION

Thyroid function tests are routinely performed to determine the status of thyroid function. Biochemical analysis of the serum concentration of tri-iodothyronine (T3), tetra-iodothyronine (thyroxine, T4) and thyroid stimulating hormone (TSH) are, therefore, extensively employed to diagnose thyroid dysfunction.

Our study was hospital based and included only patients with goiter in whom thyroid dysfunction was to be expected. Moreover patients belonged to diverse age groups and geographical locations including those where goiter is endemic due to iodine deficiency. Epidemiological studies to determine thyroid dysfunction have not been carried out in our country obviously due to scarcity of resources. However studies from Europe and North America have shown the impact and relationship of dietary iodine intake with thyroid function[8].Goiter is endemic in areas where iodine intake is deficient and less than 50 µg /day. Congenital hypothyroidism usually occurs at levels of less than 25µg/day. In areas of severe iodine deficiency, the prevalence of goitre may be as high as 80%[9]. Iodization programmes aimed at preventing goitre and cretinism in children may, however, induce thyrotoxicosis in nodular goiters especially those over 40 years of age. Nodules in

nodular goiters may become autonomous and to thyrotoxicosis[10].

Figures for subclinical and overt thyroid dysfunction vary greatly in the literature and attempts have been made to ascertain its possible etiology. In iodine-replete areas, autoimmune diseases of the thyroid gland are found to be associated with thyroid dysfunction. These include Hashimoto's thyroiditis, Graves' disease and primary atrophic hypothyroidism[10]. In these communities, the prevalence of hypothyroidism is estimated to lie in the range of 1 to 2% and is 10 times more common in women as compared to men. Studies from USA, Japan and Northern Europe also give a wide range for the prevalence of spontaneous hypothyroidism. This is estimated to be 0.6 to 12 per 1000 women and 1.3 to 4.0 per 1000 men. Gussekloo J and colleagues in Leiden, Netherlands investigated old subjects with ages ranging from 85 to 89 years and detected overt hypothyroidism in 39(7%) out of the 558 subjects[11]. The prevalence of hypothyroidism was found to be much lower in iodine deficient areas as Lombardi AF and Knudsen N in their studies[12,13]**.** Biondi B and colleagues in their study concluded that in the iodine-replete areas, the commonest cause of hypothyroidism was chronic autoimmune thyroiditis[14].The Whickham survey conducted in the Northeastern part of UK, 8% of women and 3% of men were found to have subclinical hypothyroidism[15]. In US, the Colorado study found that 9.0% of the subjects tested had subclinical hypothyroidism[5]. In the National Health and Nutrition Examination Survey (NHANES III), approximately 2% of adolescents aged 12–19 years were found to have a serum level of TSH more than 4.5mIU/l and the TSH level increased with age in both men and women & that this was higher in the white people as compared to blacks[4]**.** A low iodine intake and hypothyroidism during pregnancy could have serious consequences. Most children born to such mothers will develop mental retardation and growth failure.

In contrast to hypothyroidism, the etiology of hyperthyroidism is relatively easier to ascertain. The commonest cause is Graves' disease followed by toxic multinodular goiter. Other less common causes include toxic nodule or toxic adenoma and thyroiditis. Gussekloo J and colleagues in their study found that 0.5 to 2% of women had hyperthyroidism in iodine-replete areas & it was 10 times more common in females than males[11]. A higher prevalence of hyperthyroidism (6-10%) was noted in areas of iodine deficiency, perhaps, due to development of autonomous nodules in multinodular goiters[10,13]. The overall prevalence of subclinical hyperthyroidism is reported to be 3%. In the NHANES III survey the highest prevalence of subclinical hyperthyroidism was found in the 20 to 39 years and > 79 years age groups[4]. In our study both subclinical and overt hyperthyroidism were seen in the relatively younger 26-35 years age group, a finding similar to those of the above study for the lower age range.

CONCLUSIONS

The majority of patients presenting with goiter are euthyroid albeit a small proportion which has a deranged profile. Estimation of serum T3, T4 and TSH provide a clue to the thyroid function. Patients with goiters should be routinely screened to institute proper treatment and avoid operative complications in those who require surgery.

Conflicts of interest: The authors declare no conflict of interest in relation to this study.

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